

Factsheet: Asthma in Children and Adolescents

Tower Hamlets Joint Strategic Needs Assessment 2016

UPDATED 2016

Executive Summary

- Asthma is a treatable long term condition that affects the airways. Approximately 4.4% (2,901) of children under 19 years of age in Tower Hamlets were diagnosed with asthma in 2014¹.
- Tower Hamlets is diagnosing more children with asthma than its neighbouring boroughs¹.
- Good treatment and care that involves use of prescribed inhalers and regular reviews of symptoms and medication and can prevent unnecessary hospital admissions and mortality⁸.
- To reduce the risk of persisting asthma, children are advised to avoid exposure to tobacco. General Practices are incentivised to record the number of young people who smoke and have asthma so that interventions can be implemented. According to the Quality Outcomes Framework, Tower Hamlets has recorded the smoking status of a higher rate of asthmatic young people between 14-20 years than England as a whole².
- Even though prevalence of diagnosed asthma is high in Tower Hamlets, emergency hospital admissions for asthma are lower than England, London and neighbouring boroughs (2012/13 data)².
- From 2014/15, to reduce hospital admissions and preventable fatalities general practices within Tower Hamlets have appointed an asthma champion and are taking asthma specific training. Additionally, specialist pharmacists are providing enhanced asthma reviews for children identified as a risk of poor control from admissions to A&E for asthma or high medication use. It includes those who receive asthma medication but are not registered as having asthma.
- There are currently no Tower Hamlets guidelines for management of asthma in the schools. Some schools do have asthma policies but this is not consistent across Tower Hamlets. However all schools are offered asthma training delivered every month throughout the year by the school health service with an expectation that key education staff are updated annually. The training explores signs and symptoms of asthma, triggers and emergency treatment.

Recommendations

Further investigation is needed for the following:

- Is there a link between preventable risk factors and comorbidities linked to hospital admissions?
- Where are the up-to-date locations of high asthma diagnoses (either geographical or general practice).
- How wide spread is the use of ‘asthma cards’ and who should complete and review these.
- When should an ‘asthma card’ be replaced by other types of care plan and who should be responsible for completing and reviewing these.
- Where are care plans routinely agreed with and given to children and their caregivers and where are the gaps.

The following is recommended to enhance work towards reaching NICE quality standards for Asthma care:

- Develop a quality indicator for Tower Hamlets General Practice for managing and reviewing asthma in children and young people, for example, the number of completed asthma plans written with patients.
- Develop management plans for schools in line with the Department of Education guidelines¹⁴ (see Appendix A) and London’s ambition for Asthma.
- Continue to raise awareness among the public, particularly parents of young children with asthma, and

¹ Clinical Effectiveness data, 2015

² Public Health England data 2015

1. What is Asthma?

Asthma is a condition that affects the airways and is characterised by variable and recurring symptoms, reversible airflow obstruction and bronchospasm. It is the most common type of childhood long-term condition³ affecting 1 out of 11 children⁴.

The risk of developing asthma is increased for those children who have a family history of asthma, early sensitivity to aeroallergens or whose mothers have smoked during or pregnancy⁵. Allergic March data also shows that children who have eczema and/or food allergies in their first years of life are more likely to develop asthma⁶.

Although asthma cannot be cured, with effective management quality of life can be improved⁷. However an acute asthma attack, if not responded to quickly and appropriately, can in some cases lead to death.

Typical symptoms usually include 2 or more of the following:

- Wheezing
- Difficulty breathing
- Excessive coughing
- Tight feeling in the chest⁸.

There is no single test that can determine whether a person has asthma or not. In children, clinical assessment and the use of a number of diagnostic tests indicate the likelihood of Asthma. Tests can include measuring airflow obstruction using spirometry, peak flow tests and assessment of reversibility (i.e. whether symptoms improve after medication) using bronchodilators. For older children who are able to understand how to do them these tests can be used to support a diagnosis. However, for younger children the diagnosis is based on a clinical assessment alone with factors such as allergy and positive family history increasing the likelihood of asthma. For children under 5 making the diagnosis can be complicated by the common occurrence of viral induced wheezing which, although presenting with similar symptoms to asthma, usually resolves as the child grows up. Doctors often prescribe a trial of inhaled medication to determine if symptoms are improved as this can support a diagnosis of asthma⁵.

When asthma has been diagnosed or a child is displaying symptoms of asthma, treatment usually involves use of reliever or preventer inhalers. These are prescribed following step guidelines depending on asthma severity⁸. Reliever inhalers or bronchodilators help to relieve symptoms and preventer inhalers contain steroids that reduce inflammation, protect the lining and reduce any swelling of the airways. Sometimes steroid tablets are given to bring severe asthma symptoms under control and sometimes Montelukast tablets are given to prevent asthma attacks and relieve allergy symptoms. Additionally, reviewing risk factors linked to the exacerbation of symptoms and any comorbidity is recommended⁸.

Risk factors linked to asthma problems include: exposure to household mould⁹, food allergies¹⁰, exposure to 2nd

³ NHS Choices (2014) Asthma: <http://www.nhs.uk/conditions/asthma/Pages/Introduction.aspx>

⁴ Asthma UK (accessed on April 2015). Asthma facts and FAQs. <http://www.asthma.org.uk/asthma-facts-and-statistics>.

⁵ Bush A. & Fleming, L. (2015). Diagnosis and management of asthma in children. *BMJ*. Supplementary 350. Pp. 1-6.

⁶ Allergy UK (2012). *The Allergic March*. <https://www.allergyuk.org/causes-and-risks-of-allergy/the-allergic-march>

⁷ London Strategic Clinical Networks Asthma Leadership Group (2014). *Driving consistency in outcomes for children and young people across the capital*.

⁸ British Thoracic Society & Scottish Intercollegiate Guidelines Network (2014). *SIGN 141: British guideline on the management of asthma. A national clinical guideline*. <https://www.brit-thoracic.org.uk/document-library/clinical-information/asthma/btssign-asthma-guideline-2014/>.

hand smoke¹¹, and poor air quality¹¹. Comorbidities associated with asthma, including dysfunctional breathing, obesity and psychosocial problems⁸.

Asthma is the leading cause of years lost to ill-health, disability or early death (DALY) in the UK for the age groups 5-9 and 10-14, and the 7th leading cause of death in the 10-14 year age group¹², yet half of deaths by asthma in the UK are preventable with good treatment and routine care¹⁸.

2. What is the policy context?

There are a number of guidelines produced for the identification and care of people with asthma. These are summarised below. Guidelines by the National Institute of Care and Health Excellence and the NHS Outcomes Strategy address asthma care for both adults and children. They are summarised in the Adult Asthma JSNA for Tower Hamlets.

London's Ambitions for Asthma

This is a set of goals outlined by the London Strategic Clinical Networks Asthma Leadership Group¹³. It expects that each London organisation that is involved with a child's care and education (i.e. primary and community care, acute care, pharmacy, schools) will appoint clear named lead who will be responsible and accountable for asthma and the delivery of the following standards:

Proactive care

Every child with asthma or pre-school wheeze:

1. should have access to a named professional who will ensure that they receive holistic integrated care which must include their physical, mental and social health needs
2. should be supported to manage their own asthma with the help of their family including access to advice and support so they are able to lead lives free from symptoms
3. should grow up in an environment that has clean air, that is smoke free and has access to an environment that is rich with opportunities to exercise

Accessible care

Every child with asthma or pre-school wheeze:

4. should have a diagnosis and severity of wheeze established in a timely fashion
5. should have prompt access to their inhaler device in school and asthma care advice from trained named professionals/ asthma champions
6. in an emergency should have access to immediate medical care and advice
7. should have access to high quality, evidence based care from primary, secondary and tertiary healthcare professionals within a timely manner 24/7 and 7/7.

Co-ordinated care

Every child with asthma or pre-school wheeze:

8. should be enabled to manage their own asthma by having access to a personalised, interactive,

⁹ Gent, J.F., Kezik, J.M., Hill, M.E., Tsai, E., Li, D.W., Leaderer, B. P. (2012) Household mold and dust allergens: exposure, sensitization and childhood asthma morbidity. *Environmental Research*, vol. 118, pp. 86-93.

¹⁰ Roberts, G., Patel, N., Levi-Schaffer, F., Habibi, P., Lack, G. (2003) Food allergy as a risk factor for life-threatening asthma in childhood: a case-controlled study. *Journal of Allergy and Clinical Immunology*, vol. 112, pp. 168-74.

¹¹ Dick, S., Doust, E., Cowie, H., Ayres, J. G., Turner, S. (2014). Associations between environmental exposures and asthma control and exacerbations in young children: a systematic review. *BMJ Open Access*. <http://bmjopen.bmj.com/content/4/2/e003827.short>

¹² Institute for Health Metrics and Evaluation (2013) *GBD Arrow Design*: <http://vizhub.healthdata.org/irank/arrow.php>

¹³ London children and young people strategic clinical network (2015) [London asthma standards for children and young people](#). NHS England (London region).

- evidenced based asthma management plan linked to their medical record and they understand it
9. should have a regular structured review by trained healthcare professionals yearly or every 3 months depending on control, and within 48 hours after an exacerbation
 10. should have access to a commissioned package of care which includes peer support and educational packages and self-management tools
 11. every child should be able to expect all health professionals involved in their care to share clinical information in real time to ensure seamless care
 12. should have access to a structured, formalised transition processes from child to adult care to ensure children don't fall between the gaps

Department of Education

The Department for Education (2014) has produced guidance for governing bodies of schools on [supporting pupils at school with medical conditions](#) including Asthma¹⁴. Within this guidance it outlines roles and responsibilities for all those involved in decision making and care of pupils, including policy makers, teachers, parents, healthcare professionals and the pupils themselves.

The guidance recommends including pupils in the decision making of their care, strong communication between parents, teachers and healthcare professionals when a medical condition has been identified and children should have ready access to their medications when needed. It provides guidelines in the form of a flow chart for developing individual health care plans for pupils when a new medical condition has been identified (see Appendix A).

3. What are the effective interventions?

Prevention

Systematic reviews of research looking at prevention measures that can be taken in order to reduce the risk of developing childhood asthma or exacerbation of symptoms have found the following:

- Breastfeeding rates reduce rates of asthma on 0-2 year olds by 78%, although this effect diminished for the older age groups¹⁵.
- Reducing exposure to 2nd hand smoke through banning smoking in public places has been found to reduce hospital admissions for children for asthma by 10.1%¹⁶.
- Improving air quality, with particular focus on nitrogen dioxide (NO₂) and particulate matter (PM_{2.5-10}) can reduce asthma symptoms or hospitalization for acute asthma attacks¹¹.

National Review of Asthma Deaths

The National Review of Asthma Deaths¹⁸ report investigated why there are still preventable asthma deaths in the UK. Among its recommendations it stresses that parents/carers and teachers of children with asthma and should receive education on asthma management, including the how, why and when they should receive their medications and how to recognise when their asthma is not controlled and when to seek emergency advice.

4. What is the local picture?

Prevention

Key factors have been found to help with asthma reduction and outcomes: breastfeeding and reducing childhood exposure to cigarette smoke and poor air quality.

¹⁴ Department of Education (2014) *Supporting pupils at school with medical conditions*.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/306952/Statutory_guidance_on_supporting_pupils_at_school_with_medical_conditions.pdf

¹⁵ Dogaru, C. M., Nyffenegger, D., Pescatore, A. M., Spycher, B. D., Kuehni, C. E. (2013) Breastfeeding and Childhood Asthma: Systematic Review and Meta-Analysis. *American Journal of Epidemiology*, Vol. 179, No. 10, pp. 1153–1167.

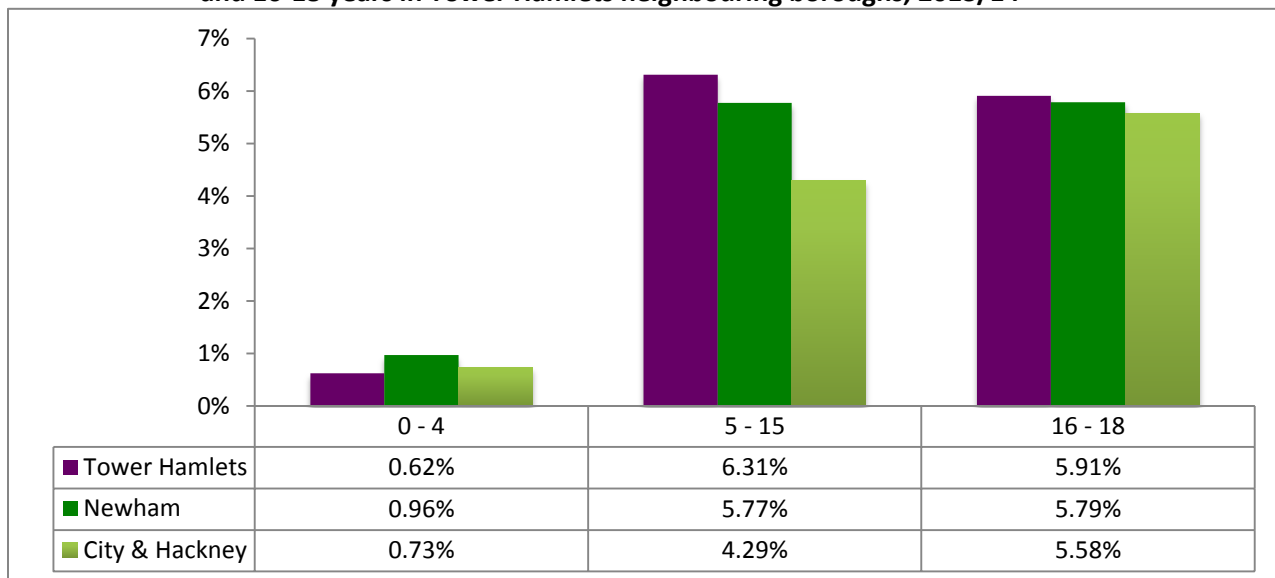
¹⁶ Been, J.V., Nurmatov, U.B., Cox, B., Nawrot, T. S., van Schayck, C. P., Sheikh, A. (2014). *The Lancet*. Vol. 383, pp. 1549–60

- The latest figures the Public Health Outcomes Framework show that in 2012/13 86.8% of Tower Hamlets new mothers breast fed their new born babies. This is higher than the national rate at 73.9%.
- Positively, 71.1% of Tower Hamlets mothers breast fed their children up to 6-8 weeks after birth (figures from 2011/12). This is more than London and England at 67.5% and 47.2% respectively. This shows that Tower Hamlets mothers are more likely to continue breastfeeding up to 6-8 weeks than national comparators.
- Fewer new mothers record themselves as current smokers at the time their children are born than comparators, thus reducing their baby’s opportunity for exposure to 2nd hand smoke. 3.2% of mothers from Tower Hamlets are reportedly smokers at the time of delivery of their baby (figures from 2012/13). This is a quarter of the national rate of 12%, and less than the London rate of 5.1%.
- In 2011, the Greater London Authority has identified 6 focus areas in Tower Hamlets for air quality improvement¹⁷. These improvement areas have been chosen based on a number of factors including locations where air pollution limit levels have been exceeded, level of human exposure and traffic patterns. Appendix B shows the air quality focus areas in Tower Hamlets.

How many people in Tower Hamlets have asthma?

- The 2014 figures show that Tower Hamlets are diagnosing more children with asthma compared with neighboring boroughs, for example, Clinical Effectiveness Group (CEG) data shows that 4.4% of children (aged 0-18 years) registered with a Tower Hamlets GP have been diagnosed with Asthma, very slightly higher than Newham and Hackney GP registered population of children at 4.3% and 3.3% respectively. Figure B shows these percentages broken down by age groups.
- Prevalence of diagnosed childhood asthma appears to have decreased in recent years. 2008/09 figures show a prevalence within Tower Hamlets that varies between 3.1 to 14.6% throughout the borough.

Figure 1: Recorded prevalence of active asthma (with recent medication) in age 0-4 years, 5-14 years and 16-18 years in Tower Hamlets neighbouring boroughs, 2013/14



Source: CEG data, 2015

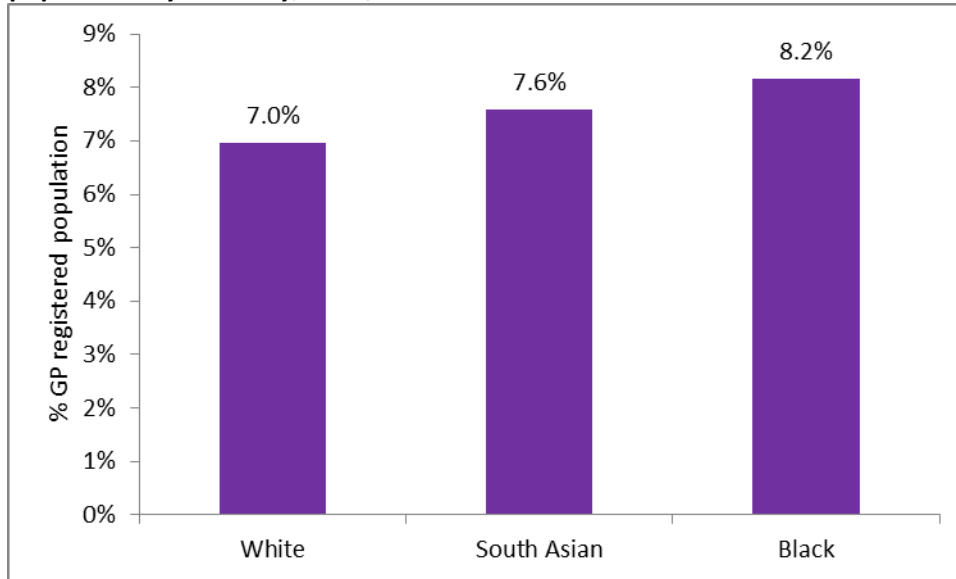
- It is unclear which GP practices these diagnosed cases are registered with so it is not currently possible to assess if some practices have more diagnoses than others, or if some areas within Tower Hamlets

¹⁷ Greater London Authority (2013). *Air Quality in Tower Hamlets: A Guide for Public Health Professionals*. <http://www.london.gov.uk/sites/default/files/Air%20Quality%20for%20Public%20Health%20Professionals%20-%20LB%20Tower%20Hamlets.pdf>

have higher prevalence of childhood asthma than others with current data. However 2008/09 data does show high levels of diagnosed prevalence, particularly in the St Peters and Bethnal Green areas (see Appendix C). One of the selected air quality improvement areas is within Bethnal Green.

- Further analysis of who within the GP registered population is diagnosed with asthma shows that there is some difference between ethnicities in prevalence of those who are diagnosed. For example, 8.2% of children aged between 5 and 18 years who identify as black have an asthma diagnosis, compared with 7% of those who identify as being white (see Figure C).

Figure 2: Prevalence of diagnosed Asthma in age 5-18 years in Tower Hamlets GP registered population by ethnicity, 2013/14

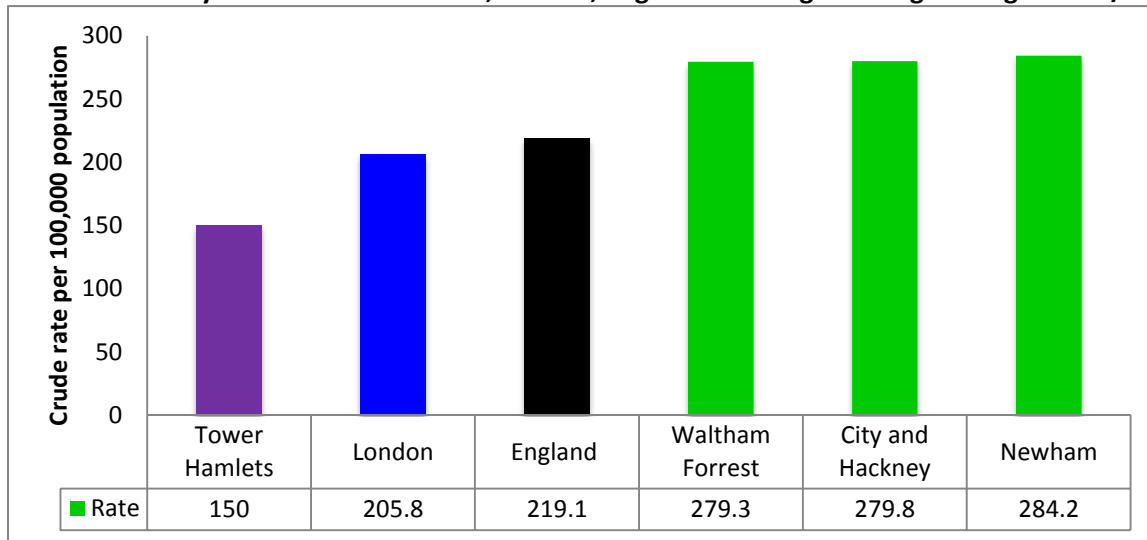


Source: Clinical Effectiveness Data, 2013/14.

Emergency Hospital Admissions

- Emergency Hospital admissions are low in Tower Hamlets in comparison to London, England and neighbouring boroughs (see Figure D). In 2012/13 there were 93 hospital admissions for Tower Hamlet’s GP registered children aged 0-18 years. Although this is an encouraging figure, the cause may be due to a diagnosis issue as, for example, it is more difficult to provide an accurate diagnosis of asthma for children under 5 years of age. As a result, children who have not yet been diagnosed may be hospitalized with a diagnosed ‘wheeze’ or ‘viral induced wheeze’⁸.

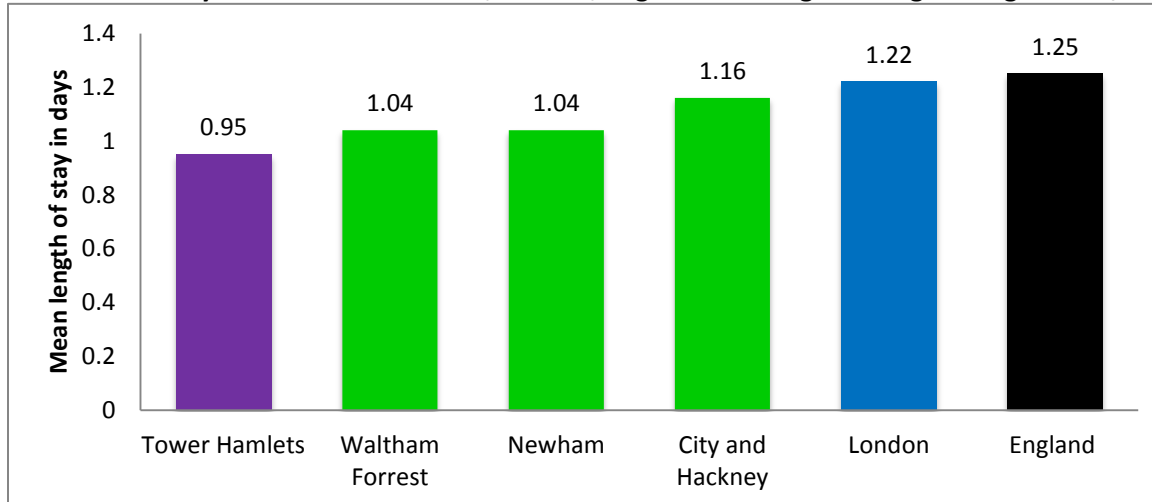
Figure 3: Crude rate of emergency hospital admissions for Asthma for GP registered children under 19 years in Tower Hamlets, London, England and neighbouring boroughs 2012/13



Source: Public Health England, Child and Maternal Health Intelligence Network via INHALE, 2015

- The average length of stay for emergency admission is also low in Tower Hamlets for GP registered under 18s at less than a day per admission. This is lower than all comparators, the highest being 1.25 days for England as a whole (see Figure E).

Figure 4: Crude rate of emergency hospital admissions for Asthma for GP registered children under 19 years in Tower Hamlets, London, England and neighbouring boroughs 2012/13



Source: Public Health England, Child and Maternal Health Intelligence Network via INHALE, 2015

- It is not possible to review whether management of preventable risk factors and comorbidities reduce hospital admissions as such data is not currently available.

5. What is being done locally to address this issue?

Primary Care

To improve quality of both child and adult Asthma care in Tower Hamlets, from 2014/15 the North East London Clinical Support Unit's medicines management team is providing educational support and incentives to GP Practices to undertake the following:

- Appoint an asthma champion who will conduct a reflection on the NRAD (National Review of Asthma Deaths) Executive Summary¹⁸ to the CCG.
- The asthma champion or a practice nurse will undertake a set of British Medical Journal recommended E-learning modules on 'Patient with Asthma'.
- Two or more members of staff from each practice will attend in-house organised training and submit a mini-reflection to the CCG
- Submit evidence of disseminated learning to other staff members within the practice.

Additionally practices have been provided with resources that will enhance their learning, including review templates, asthma action plans and checklists.

School Health Service

The school health service (SHS) provides support to families and schools in order to identify children who have been diagnosed with asthma and therefore require on-going treatment and those who have presented with acute illness and have been prescribed bronchodilators for short term use. It is important that education staff, parents and children themselves are aware of their diagnosis and understand the on-going expectation for treatment. School nurses liaise with primary care colleagues to confirm diagnosis and treatment plans and to ensure asthma cards are completed. This information is then shared with education staff in order to ensure that children can be supported to comply and emergency plans are effective. Where a child has an associated diagnosis which requires a care plan (for example; allergies) reference to their asthma diagnosis is made on that care plan and staff are supported to consider the child's presenting symptoms in view of both conditions.

Education staff are also supported through training and the school health service delivers training every month on a rolling programme. This training is offered to all education staff working in Tower Hamlets and supports increase in knowledge and skills when supporting children. In addition, the SHS has a parent workshop which is delivered in schools to support an increase in knowledge for parents of children who have asthma. This workshop has previously been delivered in schools where there is a higher prevalence of children diagnosed with asthma and where A & E attendance is identified as being high.

The SHS has an annual training update that ensures evidence based best practice is followed. In addition, the service regularly reviews the Asthma UK guidance and clinical staff are expected to remain up-dated through CPD (continuous professional development).

Senior members of the SHS have engaged with the current paediatric respiratory working group which is looking at how the professional network can support children and their families more effectively. This has resulted in the agreement of an audit into the use of 'asthma cards' and their effectiveness including reviewing and considering an alternative asthma action plan for children with a diagnosis of asthma for use in the community/home setting.

Children's Respiratory Medicines Optimisation Programme

From 2015/16 specialist pharmacists from Bart's Health or Clinical Support Unit provider pharmacists will provide face to face asthma reviews for children registered with GP practices in Tower Hamlets. Children who have had a recent A&E admission due to asthma and those who have been prescribed asthma medication but are not on the QOF asthma register will be targeted. Practices that have high prescribing of respiratory medications will also be targeted.

The objectives of these reviews are to improve the general quality of asthma reviews for children in Tower

¹⁸ Royal College of Physicians (2014). *Why Asthma Still Kills. The National Review of Asthma Deaths (NRAD)*.
<http://www.bsaci.org/LiteratureRetrieve.aspx?ID=128628>

Hamlets, while ensuring appropriate medications are prescribed and waste of asthma medications is reduced. Additionally, through these reviews it is expected that asthma admissions to hospital are reduced and the quality of diagnoses coding is improved.

Child Death Overview Panel (CDOP)

CDOP have a responsibility to review all child deaths so that recommendations can be made for prevention of future mortality. Based on CDOP investigations into local childhood asthma deaths the London Safeguarding children's board have put together a number of recommendations for the management of acute asthma for which Tower Hamlets has taken action. These include:

- Strengthened procedures by the school health service for identifying children with asthma so that action plan in case of acute attack is in place
- The development of communications plans with Children's Centres, Health Visitors and other frontline staff to raise public awareness of how to identify a child with acute life threatening illness (e.g. acute asthma attack) and how to call for an ambulance. Action has included consultation with parents and carers in children's centres, cascading of messages through children's centres, schools and a range of newsletters, paediatric first aid training for parents, training for school nurses on asthma.
- A representative from Public Health has now joined the London Safeguarding children's board Community Engagement and Communications sub group to strengthen communication of CDOP messages across the board.
- To continue to raise public awareness of how to manage an acute asthma attack
- Ensure parents of children with asthma are well informed about how to manage an acute asthma attack

To be actioned:

- Audit the use of 'asthma cards' by School Health.
- Explore a method of Auditing number of Asthma care plans that have been jointly agreed with and understood by caregivers.
- Explore the understanding of how to manage an acute asthma attack by parents whose first language is not English.
- The school health service to engage with key health professionals in exploring how asthma cards are currently completed and by whom. Identify possible alternative ways of formulating Asthma care plans working with parents, GPs, specialist care and school and aligning with the IHCP strategy for other long term conditions.

Air Quality Improvement

A number of measures to reduce air pollution have been put in place in Tower Hamlets. These include implementing an age limit for high polluting vehicles, i.e. black cabs and private hire vehicles; investing in cycling and using cleaner hybrid and hydrogen buses¹⁷.

6. What evidence is there that we are making a difference? Impact on Indicators.

Quality Outcomes Framework (QOF)

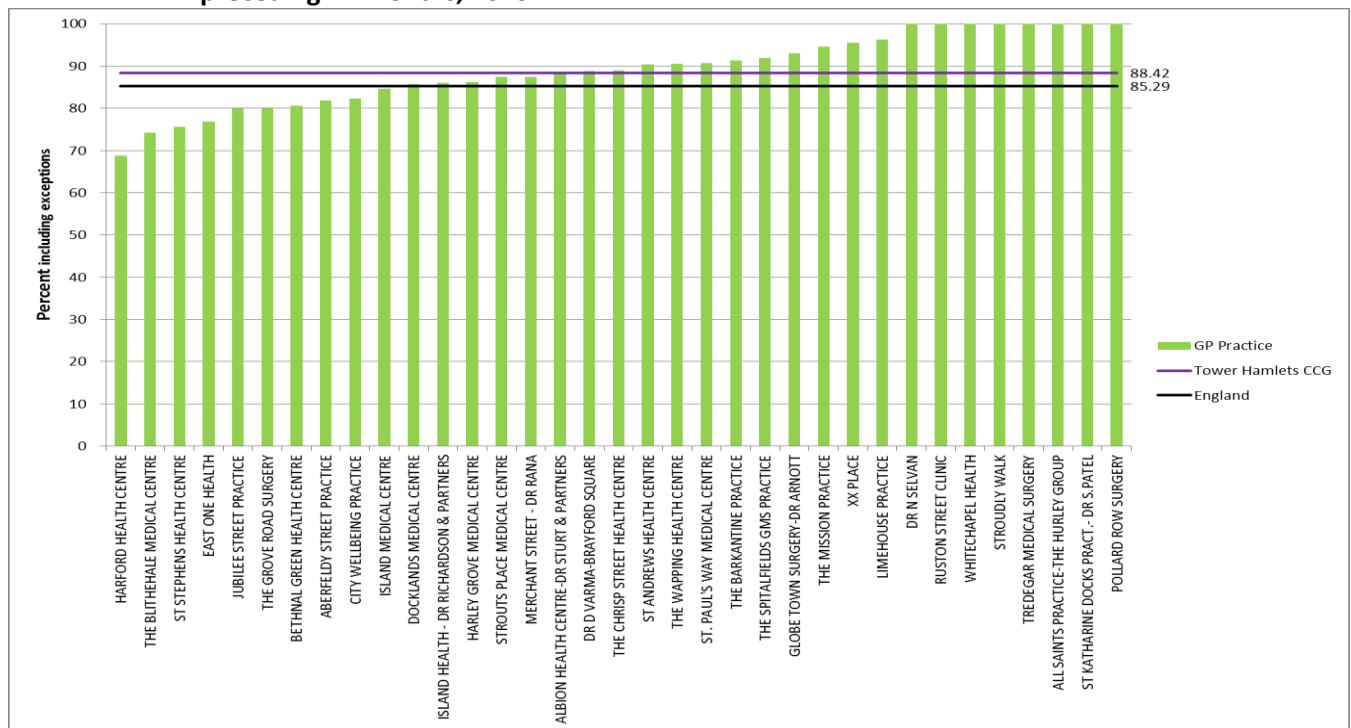
The QOF is a voluntary incentive programme that allows for measure of GP surgery performances on a number of health topics. Performance of these topic areas can be compared nationally and between practices. There is one QOF indicator relevant for the child population alone for which local data is available, AST004. The other QOF indicators, AST001, AST002 and AST003 are relevant for children and young people as well as adult asthma, they do not differentiate from adult asthma. They look at the number of registered patients have been diagnosed with asthma, who have received measures of variability or reversibility around the time of diagnosis and who have had an asthma review in the last 12 months. These indicators are reviewed in the Adult Asthma JSNA for Tower Hamlets.

AST004 is a measure of whether young people with asthma who are aged between 14 and 19 are asked about

whether they smoke, it acknowledges that this is the age at which most smokers begin smoking which increases the risk of persisting asthma. Recording smoking status allows for smoking prevention measures to be encouraged.

- Overall, GPs within Tower Hamlets are performing well in this indicator in comparison to the national average in 2013/14. For example eight practices have recorded the smoking status of all of their patients who meet the criteria and only one practice has recorded the smoking status of less than 70% of its patients who meet the criteria (see Figure G).

Figure 5: QOF AST004, The percentage of patients with asthma aged 14 or over and who have not attained the age of 20, on the register, in whom there is a record of smoking status in the preceding 12 months, 2013-14



Source: Quality Outcomes Framework, 2015

7. What is the perspective of the public?

We do not currently have available information on the perspectives of the public regarding asthma and its treatment and care in Tower Hamlets. However, in 2015/16, Tower Hamlets Clinical Commissioning Group will be commissioning research in the form of focus groups to gain an understanding of what children and their parents understand about asthma and the way it is managed in Tower Hamlets.

8. What more do we need to know?

- Does management of preventable risk factors and comorbidities reduce local hospital admissions?
- Which GP practices are the diagnosed cases of asthma registered or is there a geographical link to asthma diagnoses prevalence?
- How widespread is use of 'asthma cards' by School Health and how effective are they?
- What is the number of Asthma care plans have been jointly agreed with and understood by caregivers and where are the gaps?

9. What are the priorities for improvement?

- Develop a quality indicator for Tower Hamlets General Practice for managing and reviewing asthma in children and young people
- Develop management plans for schools in line with the Department of Education guidelines (see Appendix A) and London’s ambition for Asthma. Including a communication strategy between health care professionals, teachers and parent’s/carers involved in the care of the child as well as the child in question regarding healthcare plans and ready access to medication. Also explore the use of ‘asthma cards’ in schools.
- To continue to raise public awareness of how to manage an acute asthma attack, including parents with children with asthma and parents whose first language is not English

10. Contacts / Stakeholder Involvement

Contacts

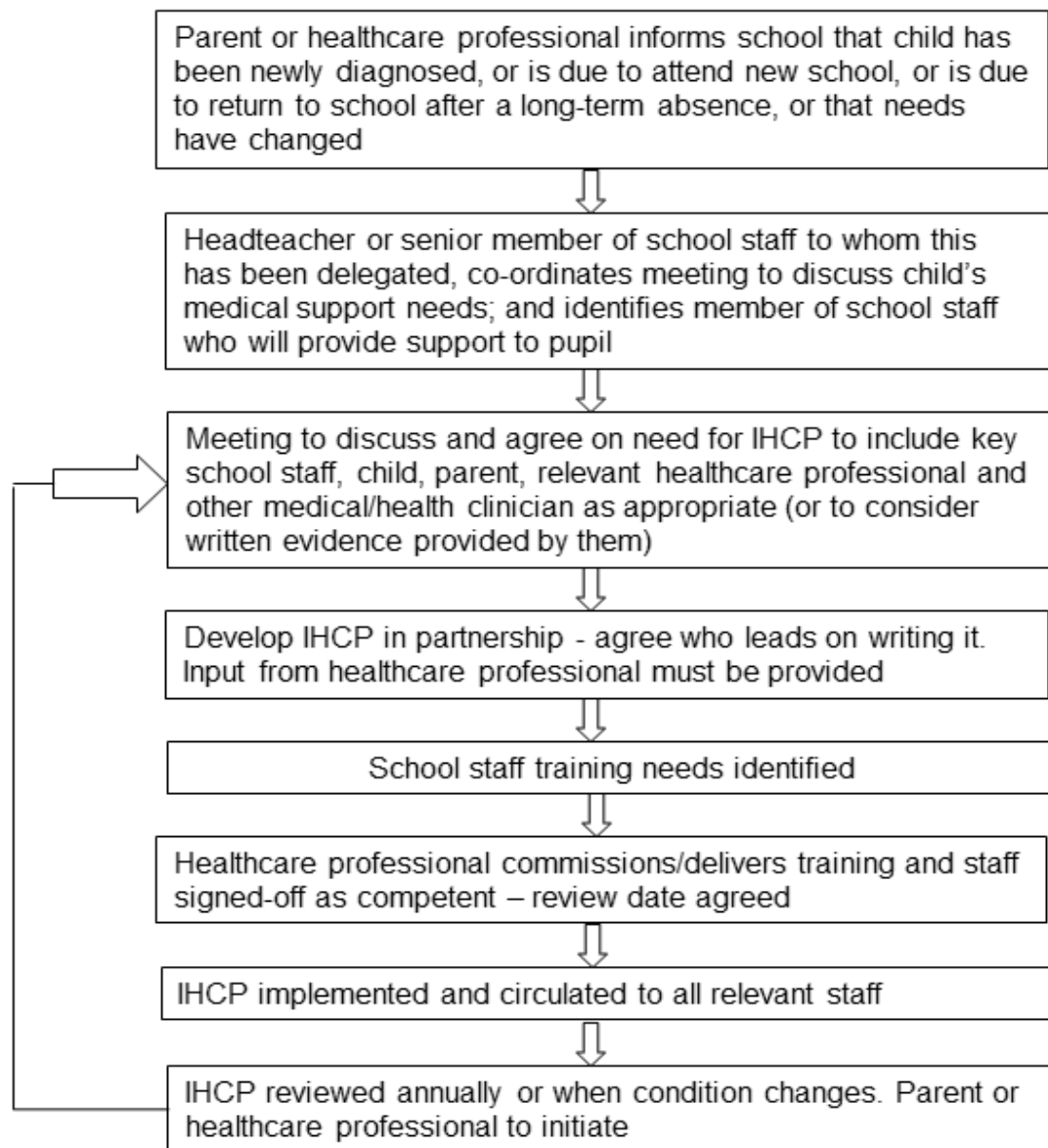
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- Monika Bajaj, Barts Health
- Ruth Cohen, Head of Nursing, Compass Wellbeing CIC
- Neil Douglas, Clinical Lead, Children, Tower Hamlets CCG
- Abigail Knight, London Borough of Tower Hamlets, Public Health
- Simon Twite, London Borough of Tower Hamlets, Public Health
- Geoff Mole, London Borough of Tower Hamlets, Public Health
- Yasmine Korimbux, North East London Clinical Support Unit
- Christine Martin, Barts Health, Child Death Overview Panel

Appendices

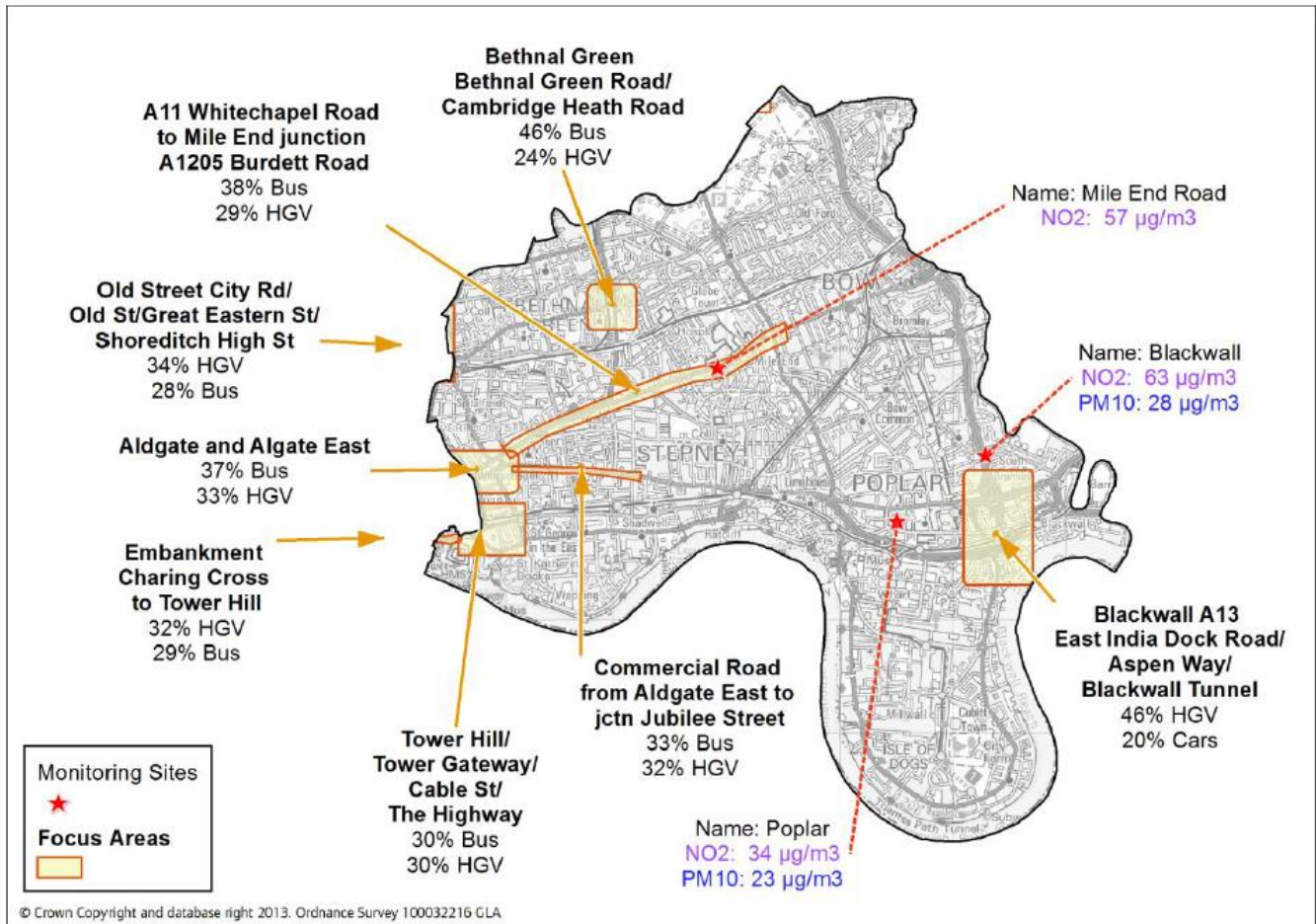
Appendix A: Model process for developing individual healthcare plans



Source: Department of Education (2014) Supporting pupils at school with medical conditions.

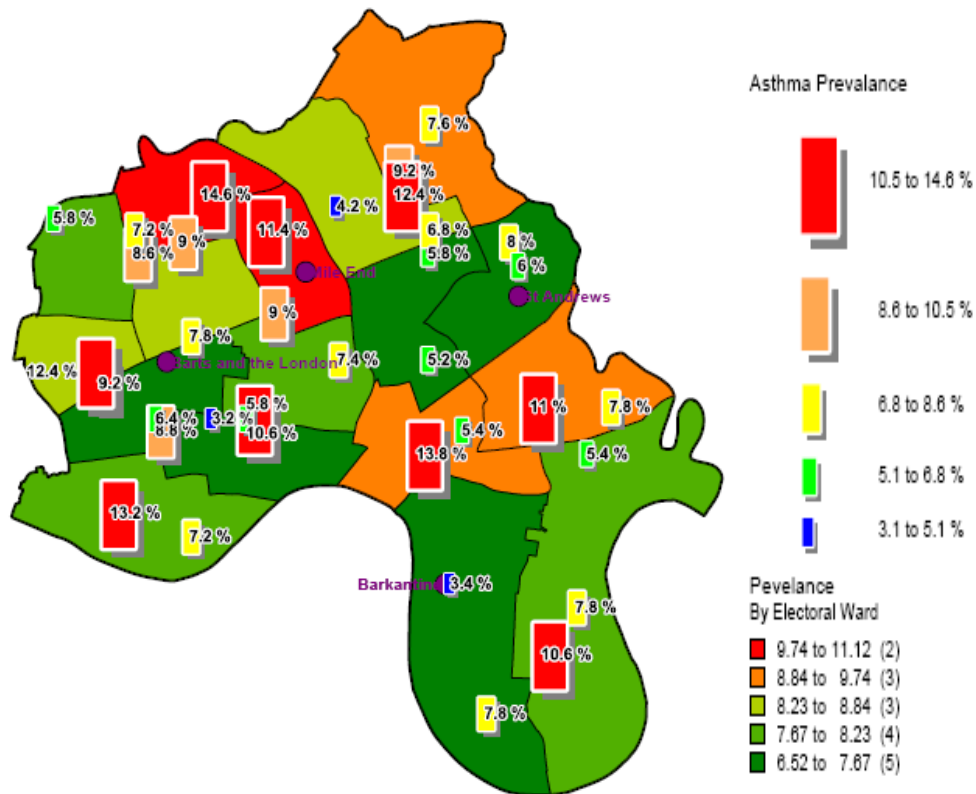
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/306952/Statutory_guidance_on_supporting_pupils_at_school_with_medical_conditions.pdf

Appendix B: Tower Hamlets Air Quality Focus Areas, 2011.



Source: Greater London Authority (2013). *Air Quality in Tower Hamlets: A Guide for Public Health Professionals*.

Appendix C: GP Registered Asthma Prevalence in Tower Hamlets by wards, 2008/09



Source: GP registration data, 2009