

Cost Effectiveness of Wirral Nurse Practitioner Services for the Homeless

Brief Report

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1.0	11/06/2013	Brendan Collins	Rebecca Mellor	First draft
2.0	19/06/2013	Brendan Collins Hannah Timpson Rebecca Mellor		Included cost breakdown and more qualitative evidence
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Summary

- Since 2010, Wirral has commissioned a nurse practitioner service for homeless people for the healthcare of vulnerable homeless individuals.
- From looking at the evidence for cost effectiveness of some individual elements of the homelessness nursing service, the service would be regarded as cost effective using a willingness to pay threshold of £20,000 - £30,000 per QALY (quality adjusted life year) gained.
- Looking at six elements of the service; hep B and flu vaccinations, screening for gonorrhoea, chlamydia and hep C, and referral to alcohol treatment, the overall cost per QALY compared to no intervention is estimated at £8,876.
- There are likely to be a lot more elements of the service that are cost effective in improving people's health and wellbeing, reducing unnecessary A&E presentations, and reducing the spread of infectious diseases.

Recommendations:

- Continue to offer and fund the bespoke nurse practitioner services within the hostel settings.
- Review current health assessment components to identify if any further elements are required (in light of the findings in this report) for example monitoring of non-communicable diseases such as type 2 diabetes, liver function testing, exterior abdominal checks.
- Service to address with their clients the key risk factors (sedentary lifestyle and an unhealthy diet) associated with developing type 2 diabetes and provide and/or signpost to interventions to reduce these lifestyle issues.
- Investigate opportunities to develop/provide prescribing service.
- Investigate opportunities to enhance the information provided on sexual health and contraception.
- Clear referral pathways to refer to mental health nurse.
- Raise awareness generally of service to service users and staff members. Include an introduction/meeting to nurse practitioners when service users

enters hostel setting and include introduction to NP services in hostel staff's induction packs.

- Target young people with short term publicity campaign to address low awareness amongst 16-24 year olds.
- Coordinated sessions (with current hostel activity) for hostel staff and residents to raise awareness on mental health issues.

Table 1. Estimated Costs and QALYs, Homelessness Nurse Service.

Intervention	Number 2012/13	Total QALYs gained	Cost savings
Hep B vaccination	103	0.639	
Flu vaccination	120	0.0406	£187
Chlamydia screening	26	0.5616	
Gonorrhoea screening	26	2.626	£1,352
Hep C screening	59	0.1133	
Alcohol referrals	53	2.65	
Total		6.63	£1,539.00
Cost of service			£60,393
Net cost per QALY (Incremental cost effectiveness ratio)		£8,876.30	

1. About this document

This document describes a rapid assessment of the effectiveness and cost effectiveness of Wirral's nurse practitioner service for the homeless. This is based on qualitative research as well as the evidence of cost effectiveness of individual elements of the service, i.e. vaccinations, screening etc. In reality the service is probably cost effective without these elements but the evidence around a general nursing service for homeless people is less strong and it is more difficult to say how similar a service is to one that is described in the evidence. It may be that in the future a more comprehensive study could be planned, but because homeless people are often transient they can be difficult to follow up and what represents a good outcome in a general health economic study may not be achievable or may not reflect the type of outcome that is most important to the clients in this service.

2. Homelessness & Health

The interaction between housing and health has long been recognised, and in the UK until the 1950s, housing was part of the responsibility of the Ministry of Health. The main causes of homelessness are

- Personal causes - interpersonal and individual
- Structural causes - economic and housing

In many cases, there are several causes which interact. Interpersonal causes include things like domestic or sexual abuse, or relationship or family breakdown, while individual causes

include things like substance abuse or mental health problems. Most people who are homeless have a history of family conflict, even if this was not the direct cause of their homelessness. Economic causes include job loss, losing benefits, and debts. Housing causes include lack of social housing, people being evicted, or people being released from prison or other institutions, or leaving the armed forces and not having a home. Once someone is homeless the rest of their life inevitably suffers; being homeless damages a person's health, both physical and mental, as well as their resilience, self-esteem and self-confidence. Practitioners need to focus on both the internal and external causes of problems associated with homelessness.

Table 2 shows a list of health problems commonly found in homeless people. Homeless people are much more likely than the general population to die of accidents, infections, suicide and drug and alcohol causes.

Table 2: Health problems commonly found in homeless patients. (Wright & Tomkins, 2006)

Health problem	Description and examples
Mental ill-health	Schizophrenia, depression and other affective disorders, psychosis, anxiety states, personality disorder, earlier onset of drug misuse and severity of alcohol use.
Physical trauma	Injury, foot trauma and dental caries due to self neglect. Foot trauma is common in homeless people due to walking for long times in inappropriate shoes, standing or sitting for long periods (leading to venous stasis, oedema and infection), frost bite, skin anaesthesia due to alcoholic peripheral neuropathy, lack of hygiene due to over-wearing of unwashed clothing, or overgrown toe nails.
Skin problems	Inflammatory conditions e.g. erythromelalgia, infestations e.g. scabies or body lice, infections e.g. cutaneous diphtheria impetigo
Respiratory illness	Pneumonia, influenza, tuberculosis (often latent)
Infections	Blood-borne viruses e.g. Hepatitis B, C and HIV. Hepatitis A. Secondary to louse infestations e.g. typhus, trench fever, relapsing fever.
Drug/alcohol dependence	Heroin-related death secondary to respiratory coma. Cocaine – case reports of toxic inhalation leading to pulmonary inflammation and oedema ('crack lung'), agitation and paranoia due to acute toxicity and thromboembolic events. Cardiological – cardiomyopathy. Neurological – peripheral neuropathy, erectile dysfunction, Wernicke's encephalopathy, Korsakoff's psychosis, amnesic syndrome, cerebellar degeneration, alcohol withdrawal seizures. Gastrointestinal and hepatobiliary – hepatitis, liver cirrhosis, pancreatitis, gastritis, peptic ulceration, oesophageal varices, carcinoma of the oesophagus and oropharynx, cardiomyopathy. Metabolic – vitamin deficiency (particularly thiamine), obesity. Psychosocial ill-health – including depression and suicide, sexual dysfunction, alcoholic hallucinosis, marital, family or employment breakdown. Complications of injecting illicit drugs include blood-borne virus infections, skin commensals or pathogens causing septicaemia, encephalitis, endocarditis, cellulitis and abscesses or deep vein thrombosis (through a combination of poor hygiene and repeated skin puncture). Tetanus may be secondary to injecting contaminated drugs.

3. Description of Service

Since 2010, Wirral has commissioned a nurse practitioner service for the healthcare of vulnerable/complex homeless individuals within homeless settings using comprehensive health care assessments including provision of first line health assessment and treatment, under nurse practitioner and PGD protocols. The service is intended for Wirral residents aged 16 and over who are either;

- A rough sleeper (including people who live in squats and derelict buildings)
- A resident of a hostel/night shelter for the homeless

- A new arrival in Wirral with a history of homelessness which includes those with a nomadic lifestyle who move from city to city
- A person with a tenancy who has a history of homelessness and continues to lead a street lifestyle

The cost of the service in 2012/13 financial year was £60,393, of which 76% was staff costs, 16% was non staff costs like materials, and 8% was indirect costs and overheads.

4. Local prevalence data

The main intelligence resource for Wirral is the Joint Strategic Needs Assessment (JSNA). The number of homeless people in Wirral is not known. Although data on local homelessness is collected by numerous service providers, these systems tend to be independent of each other so there is currently no unified data collection system which provides all of the information needed to inform strategy and service development. In national data, approximately 70% of people accessing homelessness services report having a mental health problem, 32% of their hostel residents have an alcohol dependency and 63% have a drugs problem¹. Many homeless people demonstrate a tri-morbidity of physical illness, mental health problems and substance misuse. National initiatives around reducing rough sleeping and people staying in bed and breakfasts have been successful. The National Rough Sleeping Estimate for 2009 shows a 75% reduction in rough sleeping in England since the baseline was established in 1998. After Wirral Council introduced a 'Homeless Prevention and Housing Options' approach to homelessness in 2008, the number of statutory homelessness cases decreased significantly by 89% to 51 cases in 2009-10. However in line with the rest of the country, 2010-11 saw a reversal of this trend with an increased demand on the service and a corresponding increase in statutory homeless acceptances to 77 (an increase of 51% compared with the previous year).

Although many homeless people are registered with a GP, the evidence suggests that few actually attend their GP for health problems and many go to A&E². A paper by Deloitte 'Homelessness is bad for your health'³, estimated the total national cost of admissions in homeless people as £85million. This report recommends letting people register with GPs without an address, perhaps using the GP practice as their address, and having portable health records, and having medical respite care for people who do not need to be in hospital but need to be in a better environment to recover from illness. Obviously this needs to be cheaper than a hospital bed otherwise it would not be cost-effective. In Wirral, during the period between April 2009 and January 2011 (21 months) 100 patients who were recorded as living in local hostels or of no fixed abode (NFA) accounted for 505 attendances at the Accident and Emergency (A&E) Department at Wirral University Teaching Hospital (WUTH), and 215 inpatient episodes. This amounted to a cost of £337,741. The cost of the top ten most frequent homeless attenders at WUTH was £88,194. This represents a considerable opportunity for NHS cost savings. Reducing this activity by 20% would save around £39k per year, and it is likely that in reality there are many more admissions than this for homeless people so there is potential a much greater opportunity for cost savings. The reason for this is that generally whether or not an individual is homeless is not well recorded in hospital

¹ Crisis (2005). Access to mainstream public services for homeless people.

http://www.crisis.org.uk/data/files/document_library/research/service_access_lit_review.pdf

² Department of Health (2010) Healthcare for Single Homeless People. March 2010, Office of the Chief Analyst.

³ http://www.qni.org.uk/docs/Homelessness_is_bad_for_your_health.pdf

data, and addresses can be back- or forward-dated so there may be many more admissions for homeless people than this. The way hospital activity is charged back to commissioners for UK residents is based first on GP registration, then postcode, and then if someone is not registered with a GP and has no postcode recorded, the cost defaults to the host commissioner of the provider where the cost is fair-shared amongst the practices within that organisation.

5. Methods

This evaluation is based on the performance data and previous qualitative evaluation that has been carried out, it does not have any control group data or any actual raw data from the service. It therefore represents a rapid and quite broad analysis of the potential costs and benefits of the service. A lot of the sources of evidence are general and not specific to homeless people who may benefit more or less from interventions than the populations in the evidence; more because they have greater health needs, or less because they have a greater number of competing causes of health problems. Overall the service met most of its targets for 2012/13 financial year, with 593 clients in total (Table 3). The majority of service users are aged 25-54. A high proportion of service users are in drug and/or alcohol treatment, which indicates a high level of need, and also indicates that people are known to services.

Table 3. Headline performance indicators, Homelessness Nurse, 2012/13 FY.

Activity Performance Indicators		Target	Total	Target achieved
Total number of individual clients seen		600	593	No - nearly
Number of contacts made:	Wirral Drug Service clients	N/A	263	
	Wirral Alcohol clients		223	
	Clients not in treatment		272	
Number of 'new' (clients who have never been seen before)		10 new clients per month (120)	223	Yes
Number of follow up contacts and lost to follow up contacts		20 clients per month (240)	257	Yes
Number of new registrations with GPs		N/A	20	
Number of referrals received into NP service		100	132	Yes

The service performed 99 health assessments in 2012/13 and delivered 103 Hep B vaccinations and 120 flu vaccinations. In total 285 referrals were made into other services. The highest number of referrals were to alcohol services, while 36 referrals were made to Phoenix Futures, who provide an outreach service to problematic street drinkers and substance misusers. Referrals to GP and dental services should reduce the number of people attending A&E and thus should produce cost savings (Table 4).

Table 4. Activity indicators, Homelessness Nurse, 2012/13 FY

Activity Performance Indicators		Target	Total	Target achieved
Number of referrals made into other health care services:	GP	N/A	44	
	Dentist		41	
	Wirral Drug Service		19	
	Wirral Alcohol Service		53	
	Phoenix outreach		36	
	Hepatology specialist		30	
	Mental Health Nurse Practitioner		19	
	Housing options		43	
Number of interventions administered:	Blood-borne virus tests	N/A	59	
	Hepatitis B vaccinations		103	
	Liver function tests and routine bloods		78	
	Wound care/compressions		128	
	Chlamydia & Gonorrhoea screens		26	
Number of Flu vaccinations given		N/A	120	
Number of health assessments performed		95	99	Yes
Number of GP practice/forum meetings attended		1 per quarter	2	No
Number of inductions delivered to hostel staff and volunteers (can include 1:1s)		N/A	8	
Number of training sessions delivered to hostel staff & volunteers		12 sessions	8	No

6. Summary of qualitative research

This research was carried out by Hannah Timpson. A questionnaire survey was carried out during September and October 2011 with homeless clients. The survey contained 44 questions that were a mixture of closed and open ended questions. Survey respondents were recruited via the services who worked directly with them. The services that supported this evaluation were; YMCA; Wirral ARK; Forum Housing Association; Women's Refuge; Wirral Drug Service and Phoenix Outreach Service. 136 questionnaires were returned, not all questionnaires were completed so the results are reported using the data that was available. Due to the sample size care must be given when interpreting the data as this is not a representative sample. 62 of the respondents were under the age of 24 years old and 74 were aged 25 years old and above.

Awareness

- 63% of respondents were aware of the service and 44% of respondents reported using the service.
- A higher number of respondents aged 25 and over were aware of the service and used the service. This was not the case for those aged 18-24 years.
- There was a significant correlation between age and awareness. The data show that 18-24yr old have the highest response for none awareness. Those aged 25-54years old have the highest rates of awareness and 55years and older have the lowest levels of awareness.

- There was no significant relationship between awareness and gender.

Use of service

- There was a significant correlation between age and use. The data show that 18-24yr old have the highest response for none use of service. Those aged 25-54years old have the highest rates of use and 55years and older have the lowest levels of use
- There was no significant relationship between level of use and physical health rating (i.e. we were not able to identify whether those with poorest levels of physical health are accessing the service).
- There was no significant relationship between use and gender.

Experience of service

- 57% respondents replied to question regarding their experience of which 35% found the service helpful, No negative responses were given.
'found her caring and helpful'; 'very approachable and down to earth'; 'found her really good'; 'happy with what is provided, Kerry cares and is committed to helping me. She helps me a lot'; 'made me feel welcome, offered health check and explained about services'; 'easy to access'
- 2% suggested the service needs to be changed and those changes included:
'..should be able to prescribe medication and treat things'; would be nice if you put your name down and every month you get free stuff about safe sex and condoms'

What clients would have done had service not existed

- The numbers for this question were too small to correlate any relationships between a person's call to action if healthcare was required and so are reported as percentages of the sample.
- 53% did not provide an answer for this question;
- 23% said they would go to their GP (of which 87% were aged 25years and over and of which 45% reported their physical health to be between average and very poor);
- 13% reported they would do nothing.
'deal with it myself'; 'just suffer as other services are too far'; good experience as I would not have gone to a doctor.'
- Of those that reported they would do nothing, 88% were aged 25 and over and 71% rated their physical health between average and very poor.

7. Cost Effectiveness of Hepatitis B Vaccinations

Hepatitis B is an infection caused by a blood borne virus, the hepatitis B virus (HBV). It can be spread by blood, from mother to child, and less frequently through other bodily fluids like saliva or semen. For many people acute HBV infection resolves with no long term health consequences, but some people develop chronic HBV which can cause liver cirrhosis and liver cancer. Because homeless people have poorer health generally they are likely to have weaker immune systems so hepatitis B infection is more likely to become chronic. The

evidence is that hepatitis B vaccination is estimated to be cost effective in high risk groups, which include homeless people. In Wirral clients are given an accelerated vaccination course (over 21 days instead of up to 6 months). It is not currently clear how many clients have had 1, 2 or 3 doses; for most people 2 doses are enough to protect them from hep B. Some studies have estimated that a whole population vaccination approach is also cost effective. A modelling study in Ireland estimated that based on evidence of the effectiveness for hep B vaccination after birth, there would be 112 discounted life years gained per 100,000 population.⁴ We have assumed that benefits are equivalent in homeless people, and that homeless people are 7.4 times as likely as the general population to be infected with hepatitis B, which is the case in the Wirral data. Based on these assumptions, vaccinating 103 homeless people should produce a benefit of 0.852 life years gained across the population. If we assume a quality of life index of 0.75 for these life years, this equates to 0.639 QALYs.

7. Cost Effectiveness of Blood Borne Virus (BBV) Tests

Blood borne virus tests are crucial in identifying people with blood borne viruses and giving them the correct advice and treatment to help to maintain their health and to reduce onward transmission. Obviously in the short term getting a disease diagnosis will decrease someone's level of wellbeing and can affect their mental health, but in the longer term it will increase their life expectancy as they can be treated. In the 2 years since the homelessness service commenced, around 90 clients have had blood borne virus tests (59 in 2012/13), of whom 28 individuals were found to test positive for hepatitis C, while a smaller number of clients (fewer than 5) tested positive for hepatitis B and HIV. These clients were referred to hepatology specialist nurse for hepatitis, or to GUM services for HIV.

Hepatitis B is much more infectious than hepatitis C but hep C has no vaccine available⁵. Hepatitis C infection in the general population is estimated to be 0.67% so this means that Hep C infection rates in homeless people tested in Wirral are 46 times greater than the general population at 31.1%.⁶ Hepatitis B was detected in 2.2% of clients which is 7.41 times greater than the estimated national prevalence of 0.3%⁷. The national incidence of Hep B (newly diagnosed cases) rate was 1.12 per 100,000 population in 2011, but most people do not get tested for hepatitis B very often so we do not know what the true incidence rate is.

A US study found that testing for chronic hepatitis C virus infection is cost-effective when the prevalence of hepatitis C in a population exceeds 0.84 percent (84/10,000), which is exceeded more than 30-fold in homeless people in Wirral. Several articles by Stein and

⁴ Tilson L, Thornton L, O'Flanagan D, Johnson H, Barry M. Cost effectiveness of hepatitis B vaccination strategies in Ireland: an economic evaluation. *European Journal of Public Health* 2008; 18(3): 275-282

⁵ Beijer, U, Wolf, A, Fazel, S. (2012) Prevalence of tuberculosis, hepatitis C virus, and HIV in homeless people: a systematic review and meta-analysis, *The Lancet Infectious Diseases* 12:11, 859-870

⁶ Hepatitis C in the UK 2011. London: Health Protection Agency, Colindale July 2011.

⁷ Health Protection Agency (2006). *Migrant Health – A Baseline Report*, Chapter 4.

http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1202115606638 Hepatitis C in the UK 2011. London: Health Protection Agency, Colindale July 2011.

⁷ Health Protection Agency (2006). *Migrant Health – A Baseline Report*, Chapter 4.

http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1202115606638

colleagues⁸ have estimated the cost effectiveness of hepatitis C screening in different populations. These assumed that without screening, individuals would on average go for 11 years before they were diagnosed as having hepatitis C infection. The closest prevalence to that of homeless people in Wirral was found in injecting drug users (IDUs had 48.6% hep C prevalence compared to 31.1% in homeless people in Wirral, a proportion of whom will be current- or ex- IDUs) which was adjusted to Wirral prevalence. The average additional number of QALYs per person diagnosed was 0.00617 compared to them being diagnosed later in life. Over the 59 homeless people screened for BBVs in 2012/13, this equates to 0.113 QALYs gained in total.

Unidentified HIV results in late diagnosis, which causes high levels of morbidity and is implicated in 73% of HIV-related deaths. A person who doesn't know their diagnosis also has a 3.5 times higher transmission rate. Several studies demonstrate cost-effectiveness of HIV testing in any population with prevalence $\geq 0.2\%$ as a result of patients being diagnosed at an earlier stage of the disease, a finding that is reflected in UK and US guidelines on HIV testing. Slight variability in findings is largely as a result of background prevalence of identified and unidentified HIV: For example, at a population level analysis, one-time rapid screening with 1% prevalence has been shown to cost \$30,800 (£18,800) per QALY. This cost remains under \$50,000 (£30,500) at prevalence as low as 0.2%.⁹

9. Cost Effectiveness of Chlamydia and Gonorrhoea Screening

The benefits from disease screening are contingent on individuals getting their results and being advised and treated appropriately. With homeless people this may not always be the case. Chlamydia is one of the most common sexually transmitted infections with 115,000 cases diagnosed in the UK in 2009. Chlamydia infection is asymptomatic in most cases, but without treatment it can be spread to others via sexual contact increasing the risk of major consequences in others. The rare but more major consequences of chlamydia infection include symptomatic pelvic inflammatory disease, chronic pelvic pain (CPP), ectopic pregnancy, infertility, and neonatal pneumonia. These major consequences are much more common in women than men. Homeless people, particularly rough sleepers, are more likely to be men than women but are more likely to have sexually transmitted infections. Modelling the long term outcomes from chlamydia screening is difficult because the most severe consequences are rare, and sexual behaviour, in terms of numbers of partners and numbers of people having unprotected sex, is complex. A paper by Hu & colleagues¹⁰ looking at chlamydia screening strategies in females found that chlamydia screening increased the number of quality adjusted life years (QALYs) experienced by an average of 0.0216 or 7.88 quality adjusted life days. Applying this to the 26 people screened gives a benefit of 0.5616 QALYs from chlamydia screening across the population.

Gonorrhoea is an STI that is less common than chlamydia, with 17,000 cases diagnosed in the UK in 2009. Gonorrhoea can cause serious health problems such as pelvic inflammatory

⁸ Stein, K., Dalziel, K., Walker, A., Jenkins, B., et al. (2004) Screening for Hepatitis C in injecting drug users: a cost utility analysis. *Journal of Public Health*, 26, 61-71.

⁹ Paltiel AD, Walensky RP, Schackman BR, et al. Expanded HIV screening in the United States: effect on clinical outcomes, HIV transmission, and costs. *Ann Intern Med* 2006;145:797-806

¹⁰ Hu, et al. (2004) Screening for Chlamydia trachomatis in Women 15 to 29 Years of Age: A Cost-Effectiveness Analysis. *Ann Intern Med* 141:501-513.

disease (PID), infertility, meningitis and septicemia. An American study¹¹ looking at gonorrhoea screening of women in urban emergency departments found that the optimum screening strategy, using a physician-collected RIS test (rapid immunochromatographic strip) produced an average net cost saving of \$80 (£52) per person tested, and an average QALY gain of 0.101 QALYs, so applying this to 26 people would give 2.626 QALYs gained and a cost saving of £1,352.

10. Cost Effectiveness of Influenza Vaccination

Influenza is a respiratory illness that is caused by influenza A or influenza B viruses. It is usually self-limiting but in some high risk groups it can lead to severe complications such as pneumonia, which in itself is more common in homeless people. In the UK flu rates peak in the winter months. There is evidence that severe complications and deaths in younger people are more common with the H1N1 virus ('swine flu') than with seasonal flu. Isolation, bed rest and clean water can be a difficult thing for homeless people to attain without being hospitalised. A study in New York found that the proportion of deaths that were from flu and pneumonia were similar for homeless people and the general population, however it is not clear if this was age-adjusted as many flu and pneumonia deaths in the general population are in elderly people whereas most homeless people are younger¹².

An economic evaluation of vaccination against pandemic flu found that vaccinating high risk groups in England would per 1000 population, save 1.2 hospital admissions, gain 1.33 QALYs and produce a net cost saving of £1,558¹³. Applying this to the 120 homeless individuals who were given flu vaccines produces a gain of 0.0406 QALYs or 14.8 quality adjusted life days, and a cost saving of £187, which is quite a modest cost and benefit but still an added benefit. Although anecdotally influenza infection rates are higher in homeless people we could not find any evidence that quantified this, i.e. with an odds ratio or relative risk of influenza infection in homeless people. If this was possible then we could possibly add a numerical weight to the average benefit across the population by a factor based on the greater risk of influenza infection. Pneumococcal vaccine is another vaccine which is recommended for at-risk groups, and rates of pneumonia are particularly high in homeless people. At the moment pneumococcal vaccination is carried out by GPs.¹⁴

11. Cost Effectiveness of Alcohol & Drug Referrals

In 2012/13 there were 53 clients who were referred to alcohol services. Based on estimates from the National Social Marketing Centre's Alcohol Value for Money tool¹⁵, for every 100 people who have alcohol screening or brief intervention which is similar to the process of making a referral, there are 5 QALYs gained. This is based on the amount of ill health that is

¹¹ Aledort JE et al. The cost effectiveness of gonorrhoea screening in urban emergency departments. *Sex Transm Dis* 2005 Jul; 32:425-36.

¹² Kerker B, Bainbridge J, Li W, Kennedy J, Bennani Y, Agerton T, Marder D, Torian L, Tsoi B, Appel K, Gutkovich A. *The Health of Homeless Adults in New York City: A report from the New York City Departments of Health and Mental Hygiene and Homeless Services*, 2005.

¹³ Baguelin M, van Hoek AJ, Jit M, Flasche S, White PJ, Edmunds WJ. Vaccination against pandemic influenza A/H1N1v in England: a real-time economic evaluation. *Vaccine* 2010; 28(12): 2370-2384

¹⁴ Fisman DN, Tuite AR (2011) Estimation of the Health Impact and Cost-Effectiveness of Influenza Vaccination with Enhanced Effectiveness in Canada. *PLoS ONE* 6(11): e27420. doi:10.1371/journal.pone.0027420

¹⁵ NSMC Value for Money Tools. Available at: <http://www.thensmc.com/resources/vfm>

caused by alcohol being reduced by a proportion of people moving from being high risk to lower drinkers. So for the 53 clients referred into alcohol services, this equates to 2.65 QALYs gained. There were also 19 clients referred into specialist drug treatment. Specialist drug treatment is also associated with cost savings in the health, social care and criminal justice systems (of £6,450 per client) and a very modest increase in QALYs (0.003 per client), based on evidence from The Drug Treatment Outcomes Research Study (DTORS)¹⁶. However these benefits cannot really be directly attributed to act of making a referral, although without a referral these benefits would not be realised.

12. Overall Cost Effectiveness Summary

Table 1 shows the overall costs and QALYs. For the individual elements we have looked at, the average QALYs gained from flu vaccination seem lower than may be expected, while the average QALYs gained from gonorrhoea screening seem to be higher than might be expected. When added together, the estimated benefits of this service add up to 6.63 QALYs gained across the population, at a cost of £60,393 and with cost savings of £1,539, which gives a net cost per QALY of £8,876. This would be considered cost effective using NICE's willingness to pay threshold of anything less than £20,000-£30,000 per QALY gained. As a rough sensitivity analysis, we tried varying the number of QALYs gained by +/- 20% (Table 5). The cost per QALY for these scenarios range from £7,397 - £11,095 which would still be considered cost effective.

Some people have suggested that QALYs should be weighted more for people from the most deprived areas, which homeless people certainly are. We have not done that in this case, but if we were to add an extra weight for disadvantage then this would mean the cost per weighted QALY would be even lower. Also we have only included cost savings with strong evidence, but it is likely that this service could be successful in reducing hospital admissions and A&E presentations, and it may be useful in the long term to try to monitor A&E presentations and hospital admissions for homeless people. There is also the chance that by making it easier for people to access healthcare and making them more aware of health problems, the service increases overall healthcare resource use, but this should still mean that people are confronting health problems earlier so may save money in the longer term.

Table 5. Sensitivity analysis based on 20% greater or fewer QALYs gained.

	High estimate - 20% greater QALYs	Central estimate	Low estimate - 20% fewer QALYs
Total QALYs	7.96	6.63	5.30
Net cost per QALY	£7,396.92	£8,876.30	£11,095.38

¹⁶ The Drug Treatment Outcomes Research Study (DTORS): Final outcomes report 3rd Edition. <http://webarchive.nationalarchives.gov.uk/20110220105210/rds.homeoffice.gov.uk/rds/pdfs09/horr24c.pdf>

Limitations of cost effectiveness analysis

The QALY gains in this evaluation are averages drawn from the evidence and do not reflect the complexities of disease progression and the particular risks and challenges that homeless people face. In this evaluation the QALYs gained from one intervention have been added to those gained for another intervention, whereas in reality if somebody has reduced quality of life from one disease, having an additional disease may cause a greater or lesser reduction in quality of life depending on how a disease affects someone's functioning. There are also competing causes of illness and death, so if someone does not die from one disease they still have to die from something else. We have not carried out any kind of probabilistic sensitivity analysis because we do not have reliable estimates of ranges of values. If we could get some idea of benefits from other elements of the service, i.e. by measuring improvement in EQ-5D then we could incorporate this.