

# Long-term Condition Management for Prisoners: exploring prevalence and compliance with QOF monitoring

**Nat Wright** (✉ [natwright@nhs.net](mailto:natwright@nhs.net))

Spectrum Community Health CIC

**F Hankins**

Spectrum Community Health CIC

**P Hearty**

Spectrum Community Health CIC

**D Allott**

Spectrum Community Health CIC

**V Allgar**

Hull York Medical School

---

## Research article

**Keywords:** Long-term conditions, prison healthcare, community healthcare, Quality outcomes framework

**Posted Date:** August 5th, 2020

**DOI:** <https://doi.org/10.21203/rs.3.rs-45365/v1>

**License:** © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

---

## Abstract

**Background:** Long-term conditions (LTCs) are a significant cause of morbidity and mortality and prisoner populations have a disproportionately high prevalence of risk factors for LTCs. The size and mean age of the prison population has increased rapidly in recent years. The UK Quality Outcomes Framework (QOF) is a national standardised framework embedded in community general practice with financial remuneration linked to assessment and ongoing review of key clinical outcomes pertaining to LTCs. However, healthcare in prisons in England is not linked to financial remuneration through the QOF framework and prison clinicians are not mandated to adhere to the framework.

**Methods:** Secondary data analysis of data extracted from the prison primary care record pertaining to patient self-report of LTC, level of confirmation by supporting evidence and compliance with QOF monitoring frameworks.

**Results:** 17% of the sample had at least one LTC, the most common condition being asthma, confirmed in 12% of the sample. Having an LTC was associated with female gender and increasing age. Prevalence rates for the other LTCs were hypertension 3%, epilepsy was 3%, coronary heart disease 2%, diabetes 2% and chronic obstructive pulmonary disease 1%. Just 34% of the eligible sample had had a QOF template completed. Higher rates of completion were associated with younger age and there were also statistically significant inter-prison differences.

**Conclusion:** There is a pressing need to embed standardised QOF monitoring systems within an integrated community/prison commissioning framework supported by connectivity between prison and community primary care records of not just the summary care record but also all activity related to QOF compliance. Amongst prisoner populations, there is high prevalence of risk factors for long-term conditions. This research quantifies the burden of disease and highlights under-developed systems for monitoring. There is an opportunity to enhance connectivity between community and prison GP settings to facilitate seamless monitoring of QOF outcomes.

## Background

Long-term conditions (LTCs) are those that are controlled, rather than cured through medication and/or other forms of therapy<sup>1</sup>. More than 15 million people in the UK suffer from a long-term condition<sup>2</sup>, with multi-morbidity also becoming increasingly problematic<sup>1</sup>.

The risk factors for LTCs disproportionately affect prisoner populations<sup>3</sup>. Currently in England and Wales, there are over 83,000 individuals imprisoned<sup>4</sup>. Compared to equivalent community populations, prisoners consult primary care doctors three times more frequently, other primary health care workers 80 times more frequently, and receive inpatient care at least 10 times more frequently<sup>5</sup>. They have higher mortality and morbidity rates from chronic disease<sup>6</sup>.

Internationally, ethical codes of practice highlight a “principle of equivalence” which states that prisoners have a right to an equivalent quality of healthcare as they would receive in the community.<sup>7</sup> However, there are significant threats to providing equivalent healthcare. For example, medical indemnity organisations acknowledge that imprisoned patients may be examined and treated in situations that are far from the norm for the rest of society. They provide examples of consultations taking place without access to GP/hospital records or being held in environments that could compromise safety for both patient and doctor.<sup>8</sup> This is particularly commonplace when patients enter remand prisons outside of normal working hours and are assessed in first night prison reception centres. In such an environment, there are significant threats to effective medicines management. Prisoners commonly enter prison without their prescribed LTC medication and confirming medications with community services is not possible outside of normal working hours. Further, once medication is confirmed and prescribed, there are potential delays in dispensing and administering medications. With the exception of opiate substitution treatment, there are no national guidelines to inform best practice regarding when it is appropriate to offer substitute medications where medication cannot be confirmed on first night assessment.

Regarding assessment for those entering prison, there is a process of healthcare screening through both “first” and “second” tools that are integral to the patient record. The former addresses issues regarding acute health need (e.g. demographic details; assessment of withdrawal from substances; contact details for community pharmacists), whereas the second screen covers an assessment of the need for ongoing management of LTCs and current immunisations.

Once patients have undergone assessment and are established in prison, there is an opportunity to obtain confirmation of their self-reported LTC through liaising with their community GP or arranging the necessary clinical tests, thus permitting the health risks posed by LTCs to be more proactively managed. In community general practice in England, the key framework to achieve this objective is the Quality and Outcomes Framework (QOF).<sup>10</sup> Such a national standardised framework is now embedded in community general practice with financial remuneration linked to assessment and ongoing review of key clinical outcomes pertaining to LTCs. However, healthcare in prisons in England is not linked to financial remuneration through the QOF framework and prison clinicians are not mandated to adhere to the framework. Rather, the only mandated process is that of all prisoners entering prison undergo the screening process outlined above. Such a process places less of an emphasis upon clinical outcomes than that outlined in the QOF framework. Therefore, since compliance with QOF monitoring is voluntary in prisons, it is possible that an opportunity to improve clinical outcomes associated with LTCs is being missed. In response to such a gap in service provision, we explored the assessment and management of LTCs in four remand prisons. By extracting routinely collected clinical data, we explored the prevalence of LTCs, compliance with both first and second assessment, and also QOF monitoring processes.

## Methods

After acquiring the necessary ethical and governance approvals, data was extracted retrospectively from the clinical records of all new entrants to four remand (two male and two female) prisons between June 1st and June 30th, 2015. All relevant data recorded in the clinical record within 12-months of arrival was extracted. Data extraction took place between June 2016 and June 2018. The rationale for retrospective data collection was that the research activity did not bias routine clinical practice which would have been a risk with a prospective process. The following data were extracted: demographics (including age, gender, ethnicity and sentence status); length of stay in prison (categorised as less than or greater than six months); prevalence of the following “tracer” physical health LTCs: diabetes, asthma, hypertension, coronary heart disease (CHD), chronic obstructive pulmonary disease (COPD), epilepsy; prevalence of co-morbid mental health (MH) conditions; proportion of QOF templates completed – and whether completion was full or partial; time to completion of QOF template; supporting evidence for the long-term conditions. The above LTCs were selected as tracer conditions because they are the physical health LTCs that commonly present in prison first night receptions and because of their potential to cause significant morbidity and mortality. The LTCs were identified by the researchers through examining the patient’s individual clinical record to retrieve self-reported information of the condition and whether it was confirmed by “supporting evidence.” Supporting evidence was defined as any one of evidence of prescribed medication(s) indicated for the condition, confirmation from patient’s community GP of the LTC or biomedical/clinical test confirming prevalence of the condition. The following biomedical/clinical tests were regarded as supporting evidence for prevalence:

- Diabetes – defined as an HbA1c of 48 mmol/mol (6.5%) or above
- Asthma – (FEV1/FVC) ratio of less than 70% but positive reversibility test as

diagnosed on spirometry (i.e. an increase in FEV1 from baseline of > 12% in response to bronchodilators)

- Hypertension – blood pressure greater than 140/90 mmHg
- CHD – diagnosed by cardiologist from radiological findings
- COPD – spirometry highlighting airflow obstruction defined as FEV1 < 80%

predicted and FEV1/FVC < 0.7 which does not show reversibility to bronchodilator therapy

- Epilepsy – diagnosed by a neurologist

Following data extraction, analysis was undertaken to assess:

- Prevalence of associated co-morbid physical and MH conditions
- Proportion of prisoners still resident in the receiving study prison 6 months after entering

and proportion with physical health or MH conditions

- Proportion with a physical health LTC that had the relevant QOF template completed either

partially or in full (prisoners residing in the prison for less than one-month were excluded to acknowledge the significant throughput of prisoners on short sentences in remand prisons which acts as a barrier to effective monitoring of LTCs).

- Time to completion of QOF template
- Qualification of the professional completing the QOF template
- Demographic associations with QOF completion
- Agreement between self-report of the LTC and confirmation with supporting evidence

Descriptive statistics are presented as mean (standard deviation (SD) or n (%). Logistic regression analysis was undertaken of clinical data and the following statistical tests were undertaken: t-tests (continuous data), chi-square tests (categorical data) or Mann Whitney tests (ordinal data). Kappa was used to measure agreement between self-reported LTC and confirmation by supporting evidence. A *P*-value of < 0.05 was considered to indicate statistical significance. Data analysis was undertaken in IBM SPSS Statistics for Windows (version 24).

## Results

In total, data was retrieved from the clinical records of 1,126 prisoners. Table 1 highlights the prisoner characteristics.

Table 1  
Demographic characteristics

		Mean (sd), min-max OR n (%)
Age		35.0 (10.4) 19–80
Gender	Male	882 (78%)
	Female	243 (22%)
	Undetermined	1 (< 1%)
Ethnicity	Asian or Asian British	47 (4%)
	Black or Black British	19 (2%)
	Mixed	47 (4%)
	White	691 (61%)
	Other	154 (14%)
	Missing	168 (15%)
Sentence status	Remand	381 (34%)
	License revoke	68 (6%)
	Trial	1 (< 1%)
	Sentenced	520 (46%)
	Unknown	152 (14%)
	Missing	4 (< 1%)
Prison	Prison A	355 (31%)
	Prison B	76 (7%)
	Prison C	167 (15%)
	Prison D	528 (47%)

185 (17%) had at least one LTC. Regarding the association between total number of LTCs (i.e. diabetes, hypertension, asthma, CHD and COPD) and demographic characteristics, there was a significant difference by gender ( $P < 0.001$ ) and age ( $P < 0.001$ ), but not ethnicity ( $P = 0.153$ ). Females were more likely to have an LTC (OR 2.12; 95% CI: 1.50, 3.00), and having an LTC was associated with older age (OR 1.05; 95% CI: 1.04, 1.07).

Table 2 highlights the number of prisoners with each of the LTCs at each prison site as confirmed by supporting evidence (i.e. met the inclusion criteria for QOF monitoring). 221 LTCs were confirmed by supporting evidence, and the most common condition was asthma, which was confirmed in 12% (135) of the sample. Epilepsy is excluded from this table since the epilepsy indicator was a “register only” (i.e. no clinical assessment required) in the 2015-16 QOF framework.

Table 2  
Proportion of LTCs in each prison site

		Prison A		Prison B		Prison C		Prison D		Total
		n	%	n	%	n	%	n	%	
Diabetes confirmed by supporting evidence?	Yes	7	30.4%	2	8.7%	5	21.7%	9	39.1%	23
	No	348	31.6%	74	6.7%	162	14.7%	519	47.1%	1103
Asthma confirmed by supporting evidence?	Yes	47	34.8%	11	8.1%	36	26.7%	41	30.4%	135
	No	308	31.1%	65	6.6%	131	13.2%	487	49.1%	991
Hypertension confirmed by supporting evidence?	Yes	11	31.4%	2	5.7%	10	28.6%	12	34.3%	35
	No	344	31.5%	74	6.8%	157	14.4%	516	47.3%	1091
CHD confirmed by supporting evidence?	Yes	6	35.3%	0	0.0%	2	11.8%	9	52.9%	17
	No	349	31.5%	76	6.9%	165	14.9%	519	46.8%	1109
COPD confirmed by supporting evidence?	Yes	1	9.1%	1	9.1%	7	63.6%	2	18.2%	11
	No	354	31.7%	75	6.7%	160	14.3%	526	47.2%	1115

The prevalence rates of co-morbid MH conditions were 31.5% for depression, 24.9% for opioid dependence, 16% for alcohol dependence, 4.2% for schizophrenia, 19.9% for other psychotic illness and 26.5% for other neurotic illness. The prevalence rate for deep vein thrombosis (presented in this paper as a physical co-morbid condition associated with the co-morbid MH condition of opioid dependence) was 1.7%. Regarding residence in the receiving prison at six months, just 11% (124) remained in the receiving study prison, whilst 75% (839) had been released and 14% (155) had been transferred to another prison. Compared to those no longer in prison at six months, for those still in the receiving study prison, there was no significant difference in the prevalence of either a physical health LTC (OR 1.19,  $P=0.487$ , 95% CI: 0.73, 1.93) or co-morbid MH condition (OR 1.35,  $P=0.112$ , 95% CI: 0.93, 1.97).

Table 3 highlights QOF completion rates for each LTC and shows low levels of QOF completion as evidenced in Table 4. Just 34% (38/112) had a full QOF completed and 11 part-completed. There was significant variation for time to completion, with a range of 5-358 days. 35 of the QOF templates were completed by a nurse, with just one completed by a healthcare assistant (2 missing data). All of the 11 part-completed templates were undertaken by nursing professionals.

Table 3  
 – QOF completion rates for each tracer condition

<b>Diabetes confirmed by supporting evidence?</b>				
	<b>Yes</b>		<b>No</b>	
<b>QOF Completion for Diabetes</b>	<b>N</b>	<b>%</b>	<b>n</b>	<b>%</b>
Yes	1	4.3%	0	0%
No	12	52.2%	1	< 1%
Not applicable	3	13%	1101	99%
No as in prison for less than 1 month	4	17.4%	1	< 1%
No because not due	1	4.3%	0	0%
No as patient DNAed	1	4.3%	0	0%
Part done	1	4.3%	0	0%
<b>Total</b>	<b>23</b>	<b>100.0%</b>	<b>1103</b>	<b>100.0%</b>
<b>Asthma confirmed by supporting evidence?</b>				
	<b>Yes</b>		<b>No</b>	
<b>QOF completion for asthma</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
Yes	32	23.7%	1	< 1%
No	48	35.6%	34	3.4%
Not applicable	5	3.7%	950	95.9%
No as in less than 1 month	34	25.2%	2	< 1%
No because not due	4	3%	0	0%
No as patient DNAed	3	2.2%	1	< 1%
Part done	9	6.7%	2	< 1%
<b>Total</b>	<b>135</b>	<b>100%</b>	<b>991</b>	<b>100.0%</b>
<b>Hypertension confirmed by supporting evidence?</b>				
	<b>Yes</b>		<b>No</b>	
<b>QOF completion for hypertension</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
Yes	4	11.4%	0	0%
No	19	54.3%	6	< 1%
Not applicable	0	0%	1081	99%
No as in less than 1 month	10	28.6%	2	< 1%
No because not due	0	0%	0	0%
No as patient DNAed	0	0%	1	< 1%
Part done	1	2.9%	0	0%
Missing	1	2.9%	0	0%
<b>Total</b>	<b>35</b>	<b>100%</b>	<b>1090</b>	<b>100%</b>
<b>CHD confirmed by supporting evidence?</b>				
	<b>Yes</b>		<b>No</b>	
<b>QOF completion for coronary heart disease</b>	<b>Count</b>	<b>Row N %</b>	<b>Count</b>	<b>Row N %</b>
Yes	1	5.9%	0	0%
No	6	35.3%	7	< 1%

Diabetes confirmed by supporting evidence?				
Not applicable	1	5.9%	1102	99.4%
No as in less than 1 month	8	47.1%	0	0%
No because not due	0	0%	0	0%
No as patient DNAed	0	0%	0	0%
Part done	1	5.9%	0	0%
Total	17	100%	1109	100%
COPD confirmed by supporting evidence?				
	Yes		No	
QOF completion for COPD	n	%	n	%
Yes	0	0%	1	<1%
No	7	63.6%	1	<1%
Not applicable	0	0%	1113	99.8%
No as in less than 1 month	2	18.2%	0	0%
No because not due	0	0%	0	0%
No as patient DNAed	0	0%	0	0%
Part done	1	9.1%	0	0%
Missing	1	9.1%	0	0%
Total	11	100%	1115	100%

Table 4  
– QOF condition confirmed by higher evidence and QOF completion

		Number of LTCs				Total
		0	1	2	3	
<b>QOF Completion (number of patients)</b>	Yes	0	36	2	0	38
	No	0	61	10	3	74
	Not applicable	941	0	0	0	947
	No as in less than 1 month	0	37	6	4	47
	No because not due	0	10	0	1	5
	No as patient DNAed	0	4	0	0	4
	Part done	0	9	2	0	11
Total		941	157	20	8	1126

Table 5 highlights associations with QOF template completion and prisoner characteristics. By univariate analysis, younger age ( $P=0.028$ ), male gender ( $P<0.001$ ) and prison site ( $P<0.001$ ) were statistically significantly associated with QOF completion. There was no significant difference by ethnicity ( $P=0.956$ ) or sentence status ( $P=0.470$ ). A multivariate analysis in a logistic regression model highlighted that only younger age ( $P=0.015$ ) and prison site ( $P=0.017$ ) remained statistically significant.

Table 5  
Characteristics of those who did and did not have QOF completed

		Yes QOF (n = 38)		No QOF (n = 74)	
		n	%	n	%
Age (Mean (SD))		37.3 (SD: 12.2)		42.8 (SD: 12.3)	
Prison site	Prison A	29	78%	8	22%
	Prison B	3	27%	8	73%
	Prison C	0	0%	31	100%
	Prison D	6	18%	27	82%
Gender	Male	35	50%	35	50%
	Female	3	7%	39	93%
Ethnicity	Asian or Asian British	1	33%	2	67%
	Black or Black British	0	0%	1	100%
	Mixed	1	20%	4	80%
	White	18	24%	58	76%
	Other	1	17%	5	83%
	Missing	17	81%	4	19%
Sentence status	Remand	12	33%	24	67%
	License revoke	0	0%	1	100%
	Trial	0	0%	0	0%
	Sentenced	21	32%	45	68%
	Unknown	5	56%	4	44%

The level of agreement between self-reported LTC and confirmation by supporting evidence was good for all conditions (see Table 6).

Table 6  
Level of agreement between self-report and confirmed by supporting evidence

		Confirmed by supporting evidence?		Total	Kappa, p-value
		Yes	No		
Diabetes self-reported?	Yes	15	2	17	0.746, p < 0.001
	No	8	1101	1109	
Asthma self-reported?	Yes	119	38	157	0.791, p < 0.001
	No	15	953	968	
Hypertension self-reported?	Yes	27	7	34	0.776, p < 0.001
	No	8	1080	1088	
CHD self-reported?	Yes	12	6	18	0.681, p < 0.001
	No	5	1103	1108	
COPD self-reported?	Yes	9	3	12	0.780, p < 0.001

## Discussion

### Summary

Our findings demonstrate the significant challenges of managing LTCs in remand prisons, as highlighted by the fact that 75% of prisoners were no longer in the receiving study prison six months after entering prison. Of those still in prison, just 11% remained in the receiving study prison, with 14% transferred to another prison. The numbers were even higher for those with an LTC. Eighty-four percent of those with an LTC were no longer in the receiving study prison at six months. Regarding MH, 54% of those with a co-morbid MH condition were no longer in the receiving study prison at six months. Therefore, still being in the receiving study prison at six months was not associated with an increased likelihood of having either a co-morbid MH or physical LTC.

Regarding prevalence, 17% of the sample had at least one LTC, the most common condition being asthma, confirmed in 12% of the sample. Having an LTC was associated with female gender and increasing age. The confirmed prevalence rates for the other LTCs were hypertension 3%, CHD 2%, diabetes 2% and COPD 1%. The prevalence of epilepsy was 3%, but there was considerable variability between prisons. The likely reason for such variability is coding practice for patients with either pseudo-seizures or alcohol withdrawal seizures.

Our findings highlighted just 34% of the eligible sample had a QOF template completed. QOF completion rates varied between LTCs and was highest for asthma (40% completion rate), and lowest for diabetes (8% completion rate). Demographic variables were associated with QOF completion. Higher rates of completion were associated with younger age. There were also statistically significant inter-prison differences. This coupled with our finding of significant variation for time to completion triangulates with the findings in our linked paper reporting qualitative findings of differing clinical practice between prisons.

### **Strengths and Limitations**

Our findings make a significant contribution to the evidence base regarding prevalence of LTCs in prisons, which constitutes an under researched area. As far as we are aware, this research is the first peer-reviewed study exploring existing processes regarding QOF monitoring in UK prisons. Whilst collated from four remand prisons, we are confident that our findings can be generalised across the remand prison estate, and also to training prisons, since all prisoners in such establishments have at some point been transferred from remand prisons.

Whilst extracting data from just four prisons could be perceived as a limitation, it remains the largest UK multi-centre research study to quantify LTC prevalence from clinical records and, the only UK study exploring prison based QOF monitoring processes.

### **Comparison with Existing Literature**

Our prevalence statistics broadly concur with previous research conducted which highlights respiratory disease as the most prevalent LTC in UK prisons and prevalence statistics of lower than 5% for each of diabetes, CHD or hypertension.<sup>11</sup> Our research highlighted that the level of agreement between self-report in the first night primary care consultation and subsequent supporting evidence was good for all the LTCs. This concurs with a UK data-linkage study in which self-report survey findings regarding LTC prevalence were cross checked with prisoner patient records and highlighted a good level of agreement regarding the prevalence of physical LTCs.<sup>3</sup>

The community prevalence rates for LTCs in the UK has been recorded as: asthma – 8% (+3.6% compared to global prevalence); COPD – 1.8% (-1.5%); CHD – 11.2% (+2.2%); diabetes – 7% (-1.8%), hypertension – 24.2% (+9.2%); epilepsy – 0.8% (-0.1%); opioid dependence - 0.4% (equal to global prevalence); depression - 3% (-0.9%); alcohol dependence – 0.9% (-0.5%) and schizophrenia – 0.95% (+0.67%). Within the UK, 1 in 4 people will experience a MH illness each year, the most common being General Anxiety Disorder (5.9%) and depression (3%). Differences can, therefore, be ascertained between the prison and community population.

### **Implications for Research and/or Practice**

The key implication for future research is that for future prevalence studies of LTCs in prison settings, extraction and secondary data analysis of routinely collected clinical data will be as effective, but less costly than administering surveys to patients. We would recommend implementing research processes that fulfil the necessary requirements pertaining to robust information governance to facilitate extraction and anonymisation of routinely collected clinical data.

Regarding implications for practice, since LTC prevalence is associated with increasing age, yet our findings show an association between younger age and QOF completion, this presents a pressing training need to target QOF activity where the burden of disease is highest.

## **Conclusions**

Such lack of engagement in QOF monitoring highlighted in our findings was despite a national requirement of prison providers through the Health and Justice Indicators of Performance (HJIPs) to report on QOF data<sup>11</sup>. The relevant document states: "Through the use of SystmOne templates and standard reporting, providers are able to self-assess their LTC monitoring, and report this as part of their HJIP data submission; providing performance outcomes against the chronic disease register and achievement against nationally recognised quality outcomes framework. This reporting enables assurance that there is parity of treatment provision between residents of the secure estate and the wider community. Providers are able to access their QOF achievement outcomes via a report embedded in SystmOne." Therefore, a disconnect is apparent between national

reporting requirements and clinical activity. This could be addressed, in part, through pending improvements in the electronic patient record linkage systems between community and prisons.

In our linked paper reporting qualitative findings, such a prospect was universally welcomed by participants and, in addition to better meeting acute health need, it was felt that this development would support seamless monitoring of QOF activity between community and prison. Therefore, this presents an opportunity to introduce QOF monitoring systems, possibly supported by an integrated community/prison commissioning framework to enable future connectivity between prison and community records of not just the “summary care record” (a minimum dataset comprising: current medication; allergies and details of any previous bad reactions to medicines; name, address, date of birth and NHS number of the patient),<sup>12</sup> but also all activity related to QOF compliance.

## List Of Abbreviations

LTC – Long Term Conditions

QOF – Quality Outcomes Framework

HJIP – Health and Justice Indicators of Performance

COPD – Chronic Obstructive Pulmonary Disease

CHD – Chronic Heart Disease

## Declarations

### *Ethical approval and consent to participate*

NHS Research Ethics Committee (REC) approval was not required as the REC deemed the project to be a service evaluation. Permission to conduct the research in the four prisons was sought from the National Offender Management Service (NOMS) who approved the project on 17<sup>th</sup> December 2015. R&D approval was granted by the healthcare organisation responsible for healthcare delivery at each of the prison sites.

### *Consent for publication*

Not applicable

### *Availability of data and materials*

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

### *Competing interests*

The authors declare that they have no competing interests

### *Funding*

A grant was provided by NHS England Health and Justice

### *Authors contributions*

NW conceived the research questions and was responsible for the overall design and conduct of the research. FH, DA and PH conducted the data extraction from clinical records. VA undertook the statistical analysis. All authors contributed to the final manuscript.

### *Acknowledgements*

The authors would like to thank Clive Adams for providing support in the design of the project. Additional thanks to Adarsh Kaul for their assistance in the design of the project and for supporting the conduct of the research in one of the research sites.

## References

1. Department of Health. Long Term Conditions Compendium of Information: Third Edition. 2013. Available from: <https://www.gov.uk/government/publications/long-term-conditions-compendium-of-information-third-edition> (accessed 23/09/19)
2. Coulter A, Roberts S, Dixon, A. Delivering better services for people with long-term conditions. *Building the house of care. London: The King's Fund*, 2013 pp.1-28.

3. Wright NM, Hearty P, Allgar V. Prison primary care and non-communicable diseases: a data-linkage survey of prevalence and associated risk factors. *BJGP Open*, 2019 p.bjgpopen19X101643.
4. House of Commons Library, 2018. UK Prison Population Statistics: Briefing Paper Number CBP-04334. Available from: <https://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN04334> (accessed 23/09/19)
5. Marshall T, Simpson S, Stevens A. Use of health services by prison inmates: comparisons with the community. *J. Epidemiol. Commun. H.* 2001 May 1;55(5):364-5.
6. Condon L, Gill H, Harris F. A review of prison health and its implications for primary care nursing in England and Wales: the research evidence. *J. Clin. Nurs.* 2007 Jul;16(7):1201-9.
7. Royal College of General Practitioners. RCGP statement on care in secure environments. 2018. Available at: <https://www.rcgp.org.uk/about-us/news/2018/july/prison-health-is-public-health.aspx> (accessed 23/09/19)
8. Medical Defence Union. MDU Journal, Volume 26, Issue 1, June 2010. Available at: <http://www.themdu.com/~media/Files/MDU/Publications/Journals/Journal/MDU%20Journal%20June%202010.pdf>
9. National Prescribing Centre. Medicines management services – why are they important? In: NICE – Medicines optimisation: the safe and effective use of medicines to enable the best possible outcomes. 2002. Available at: <https://www.nice.org.uk/guidance/ng5/chapter/Introduction> (accessed on 23/09/19).
10. British Medical Association. The Quality and Outcomes Framework (QOF). January 2019. Available from: <https://www.bma.org.uk/-/media/files/pdfs/collective%20voice/committees/gpc/gpc%20england/contract%20agreement%20qof%20guidance-jan2019.pdf?la=en> (accessed 25/09/2019)
11. NHS England. Health and Justice Indicators of Performance (HJIPs): Adult Secure Estate User Guide 2017-18. V1.5. 2017. Available from: <https://supplierlive.proactisp2p.com/PublicDocument/Get?d=l5dgapako5621843v2kb35xot3> (accessed 25/09/19)
12. NHS Digital. *Quality and Outcomes Framework, Achievement, prevalence and exceptions data - 2017-18 [PAS]* <https://digital.nhs.uk/data-and-information/publications/statistical/quality-and-outcomes-framework-achievement-prevalence-and-exceptions-data/2017-18> (accessed 25/09/19).