
**CASE FINDING ALGORITHMS FOR
PATIENTS AT RISK OF RE-HOSPITALISATION
PARR1 AND PARR2**

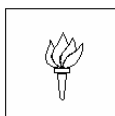
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CASE FINDING ALGORITHM FOR PATIENTS AT RISK OF RE-HOSPITALISATION

BACKGROUND/INTRODUCTION

Improving management of high cost patients, especially those with long term conditions, is increasingly viewed as an important strategy for improving health outcomes and controlling health care expenditures. An essential component of any strategy to improve care and services for these patients is the development of a case finding mechanism to identify high risk patients as early as possible to enable interventions to be targeted before substantial preventable/avoidable expenditures have been incurred and health status has deteriorated further. An effective case finding tool is one that identifies as many patients as possible who will have future high costs/utilisation without intervention, but is not so broad that it includes large numbers of patients who will not incur such costs or experience such utilisation. The ultimate goal is to target and calibrate intervention resources on those who will benefit most, allowing savings from reduced utilisation to help support the cost of the intervention.

Recognising this need, the NHS has contracted with the King's Fund, Health Dialog Analytic Solutions, and New York University to assist SHAs and PCTs interested in these issues. The project has three components: 1) a literature review to summarise what is known about case finding and risk stratification, 2) development of a case finding tool using readily available inpatient data, and 3) development of a more ambitious case finding tool that incorporates available information from inpatient records, outpatient care, accident and emergency departments, GP electronic records, social services data, and other sources.

The literature review component has been completed and is available at <http://www.networks.nhs.uk/42.php> and <http://www.kingsfund.org.uk/healthpolicy/predictiverisk.html>.

This document describes the algorithms developed for component 2 of the project, and includes user instructions in an appendix to this document. Component 3 of the project will be completed by Spring, 2006.

PATIENT AT RISK OF RE-HOSPITALISATION (PARR) CASE FINDING ALGORITHMS

Summary of the Approach

The Patient At Risk of Re-hospitalisation (PARR) case finding algorithms use prior hospital discharge data to identify patients at high risk for re-hospitalisation in the 12 months following their identification. The goal is to provide a mechanism to “flag” patients who have a high probability of subsequent emergency admissions for whom improved health care and social service management may reduce the risk of re-hospitalisation. The algorithms produce a “risk score” for the probability of future

admissions, drawing upon a broad range of information about the patient from the current hospitalisation and any hospitalisation in the prior three years, the geographic area where the patient resides, and the hospital of the current admission. The algorithms are designed to be used in “real time” (while the patient is hospitalised) or using archival data for recently admitted patients.

This approach to case finding builds on our review of the literature and has several important characteristics:

- **Use of a hospitalisation as “triggering” event** – The PARR case finding algorithms use an emergency hospital admission as a “triggering” event. The algorithms incorporate diagnostic information from the most recent admission of a patient and then examine data on prior utilisation history, patient characteristics, contextual information on the patient’s electoral ward of residence, and the hospital of admission to create a “risk score” for the probability of another admission in the next 12 months. Use of this triggering event helps improve the statistical power of the algorithms since patients with a recent hospital admission are more likely to have future admissions than patients without recent admissions. There are two basic PARR algorithms that differ in terms of the characteristics of the triggering condition:
 - **PARR1** – The PARR1 algorithm focuses on triggering admissions for specific “reference” conditions where improved management can often help prevent/avoid future hospitalisations. Clearly, a large share of hospital admissions cannot be prevented or avoided even with the most effective care and case management. “Reference” conditions are a subset of diagnoses, such as congestive heart disease, COPD, diabetes, sickle cell disease, etc., that often lead to re-hospitalisation (based on our analysis of five years of hospital discharge data) where timely and effective ambulatory care, case management, or social services can help reduce the risks of hospitalisation. These “reference” conditions are listed in Appendix A, and represent almost 20-25% of all emergency medical admissions.
 - **PARR2** – The PARR2 algorithm uses any emergency admission as a trigger and is not limited to admission for a “reference” condition. Because it focuses on a larger number of patients, it produces risk scores for more patients than PARR1, but, as documented below, it is somewhat less accurate in predicting future admissions (has a higher rate of “false positives”).
- **Designed to be used in real time or with archival analysis only** - Because effective discharge planning is likely to be an essential component of many intervention strategies, the algorithms are designed for application in real time while the patient is still in the hospital. Patients are most vulnerable in the period immediately after discharge, and planning and organising an intervention plan during the hospital stay can be critical to an effective care and management plan. However, because obtaining information on admissions in real time can be difficult for some SHAs and PCTs, we have also designed two “archival” approaches that do not entail real time application. These approaches involve analysis of archived hospitalisation data on a monthly or annual basis to identify patients who could be targeted

for an intervention in the next 12 months. The monthly approach is nearly as effective in predicting risk of future admissions as the “real time” method, and both the monthly and annual approaches are likely to be easier to implement for SHAs or PCTs with limited information technology capacity or where obtaining real time hospitalisation is difficult or not feasible.

- Use of a broad range of variables to help predict risk – The PARR case finding algorithms incorporate a broad range of variables about the patient, community, and hospital to help predict risk of re-hospitalisation. Among the data employed are:
 - Data on hospital utilisation - Data from diagnostic fields in computerised hospital admission records for the current hospitalisation and any admission in the previous three years provide data on whether the patient has a chronic condition or other co-morbidities. Also available is prior hospitalisation frequency, as well as day case utilisation, consultant treatment specialty, and demographic characteristics (age, gender, and ethnicity).
 - Community characteristics – Characteristics of the community where the patient resides are incorporated, including demographic data and underlying age/sex adjusted rates of hospitalisation for conditions that are sensitive to physician practice style. This latter variable is important because hospitalisation rates are a function not only of effective care, patient characteristics, and social circumstances or resources, but can also be significantly affected by a physician’s threshold to refer a patient to a hospital and by the admitting physician’s threshold for admission.¹ In developing the algorithm, a more than 20-fold variation was observed among electoral wards in England for these conditions.
 - Hospital of current admission – Practice style of physicians at the hospital of current admission are also relevant for similar reasons. In developing the algorithm, a more than 3-fold variation was observed among hospitals in the rate at which patients were re-hospitalised for “reference” conditions during a 12-month follow-up period.

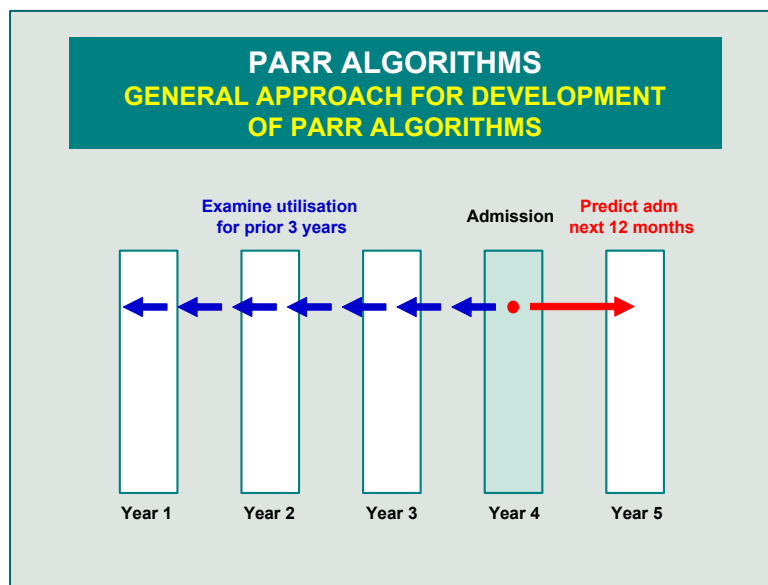
This use of a broad range of variables is critical in improving the power of the case finding algorithm. Recent analysis of one case management pilot by researchers at the University of Manchester suggests that the method of identifying high risk older patients used in that demonstration (a “threshold” model with essentially two variables: age ≥ 65 and two or more hospitalisations in the past year) was not an accurate predictor of the future risk of hospitalisation by individuals.² Our analysis in developing the algorithm indicates that for patients with those characteristics, only about 34% have an emergency admission in the subsequent year, meaning 66% of those targeted for intervention would not have had an admission during the planned intervention period. Using such case finding criteria makes it difficult to make a “business case” for even the most effective intervention since a large share of resources are targeted at patients who will not have subsequent hospitalisations.

It is important to recognise the limitations of the approach used for the PARR case finding algorithms. Using only prior hospital data (and characteristics of community and local hospital), it is not possible to predict future admissions of patients with no prior admissions. Accordingly, the PARR algorithms developed for this second component of the project are less useful in identifying patients with emerging risks of high cost and high utilisation, as opposed to those who are likely to have continuing high risks. Other characteristics of the patient’s health status are likely to be required to improve predictive power sufficiently to identify emerging risks or hospitalisation, and these issues will be explored in the third component of the project when data from GP electronic medical records (e.g. test results, lipid/blood pressure/Hb1Ac levels, BMI, health habits, visit rates, etc), A&E data, hospital outpatient data, and social services data will be incorporated.

HOW THE ALGORITHMS WERE DEVELOPED

The PARR case finding algorithms were developed using five years of Hospital Episode Statistics (HES) data (1999/2000 to 2003/2004). Admissions in 2002/3 were examined to identify a triggering admission for each individual patient, and data on prior utilisation were examined for each patient for the three prior years (1999/2000 to 2001/2) to predict whether an admission would occur in the 12 months subsequent to the “reference” admission (looking at data for the remainder of 2002/3 and for 2003/4). Patients known to have died in hospital during the “reference” admission were excluded from the analysis. See Exhibit 1.

Exhibit 1



A set of variables based on prior utilisation were created, and these data were combined with data on demographics and utilisation characteristics of the patient’s ward of residence (as described above). A series of logistic regressions were conducted to identify which variables were helpful in predicting a subsequent admission in the next 12 months. Initially, a broad set of 69 variables were tested (see

Appendix B for a list of variables). In the final equation, a subset of these variables were found to be significant predictors and were included in the stepwise logistic regression model to produce the algorithm. See Exhibit 1 for the variables included in the PARR1 “real time” algorithm.

Exhibit 1

Variables Included in PARR1 Case Finding Algorithm "Real Time" Version

Alcohol related diagnoses
Cerebrovascular disease (CVD)
Chronic obstructive pulmonary disease (COPD)
Connective tissue disease/rheumatoid arthritis
Developmental disability
Diabetes
Ischaemic heart disease
Peripheral vascular disease
Renal failure
Sickle cell disease
Prior respiratory infection admission
Number of different treatment specialists seen
Age 65-74, Age 75+
Gender
Patient ethnicity
Prior admission for a "reference" condition
Number of emergency admission in the previous 90, 180, and 365 days
Number of non-emergency admission in the previous 365 days
Total number of prior emergency admissions in previous 3 years
Average number of episodes per spell for emergency admissions
Observed/expected ratio for MD practice style sensitive admissions in ward of residence
Observed/expected ratio for rate of rehospitalizations for hospital of current admission
Diagnostic Cost Groups/Hierarchical Condition Category - (71 categories)

Disease presence and diagnostic history are based on the presence of ICD 10 codes in any diagnostic field (primary or secondary) in discharge data. The Diagnostic Cost Groups-Hierarchical Condition Category variable includes 71 of the 172 diagnostic categories from the diagnostic grouping programme developed by DxCG to risk adjust payments to managed care plans for the Medicare programme in the U.S.³ The programme examines all diagnostic fields and assigns patients to one of the 172 hierarchical categories based on the seriousness of the patient’s diagnoses or combinations of diagnoses. The other diagnostic categories used in the algorithm are based on prior work at New York University and Health Dialog Analytic Solutions in analysing predictors of high cost cases.

The algorithm was developed using a 10% sample of (HES) data for all of England for the period indicated. The coefficients for the 21 variables were then applied against a second 10% sample to validate the findings of the algorithm from the first sample. Rates of case finding, specificity, and sensitivity differed by only 1-2% in the two samples, indicating the robustness of the algorithm. The algorithm was also tested on ClearNet Admitted Patient Care (APC) data for three PCTs and comparable results were obtained. Archived ClearNet APC data combined with updated data on current admission are the expected data source that will be used by PCTs and SHAs in utilising the algorithm in practice (see the “How Can the Algorithm Be Used in Practice?” section below).

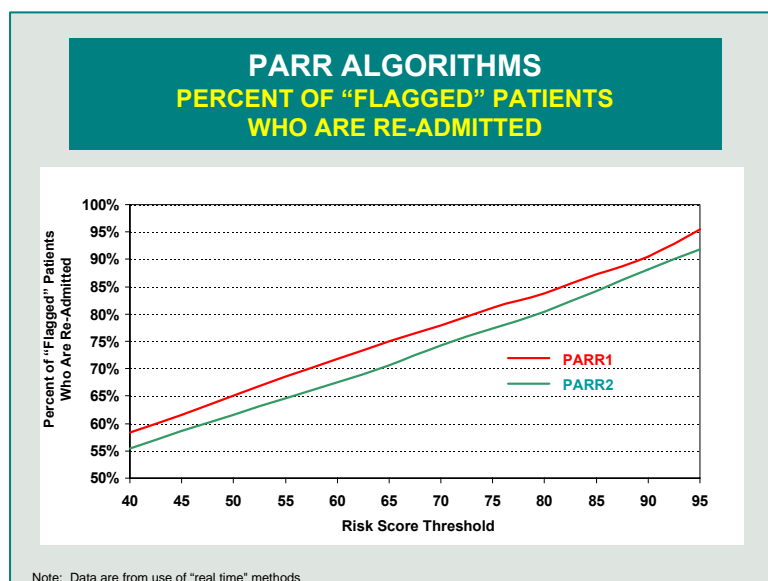
The limitations of HES data are well known. We engaged in additional data “cleaning” efforts, primarily to eliminate duplicate records and to adjust for missing

data. These data limitations generally tend to err in the direction of under-prediction rather than over-prediction. The protocols to clean and prepare HES data are believed to eliminate some true admissions (with cases deleted because of missing data elements), and since prior utilisation is an important predictor of future use, this deletion of true admissions potentially reduces predictive power of the algorithm. We also analysed death rates at the ward level and compared these numbers to deaths recorded in the HES data, finding serious data quality issues with an apparent substantial undercount of deaths in the HES data (“discharge method” data field). As a result, for some of the patients predicted by the algorithm to have a re-hospitalisation who did not have a subsequent admission (false positives in our algorithm development testing) may have died during the “reference” admission. Had accurate death data been available, these patients would have been excluded from the analysis (again resulting in a tendency of the model to under-predict future admissions). Incomplete and inaccurate diagnostic coding is a common problem with hospital discharge data. While this circumstance may improve with HRG Payment by Results where there is an incentive to capture as many diagnostic factors as possible (especially serious ones), the absence of complete diagnostic data also tends to diminish the potential power of the algorithm. These problems are likely to be compounded when using ClearNet data that may be of uneven quality, especially for more recent discharges.

OUTPUT PRODUCED BY THE ALGORITHM

The PARR algorithms produce a “risk score” for each patient with a “reference” admission. The risk score ranges from 1-100, with higher scores having a higher risk of admission in the next 12 months. In the testing of the algorithms on HES data in the development stages, patients with risk scores above 50 had a high chance of a subsequent admission, and for patients with risk scores above 70, 73-95% of these patients had admissions within 12 months. See Exhibit 2 below which shows the percentage of patients admitted with various PARR1 and PARR2 risk scores using the “real time” method.

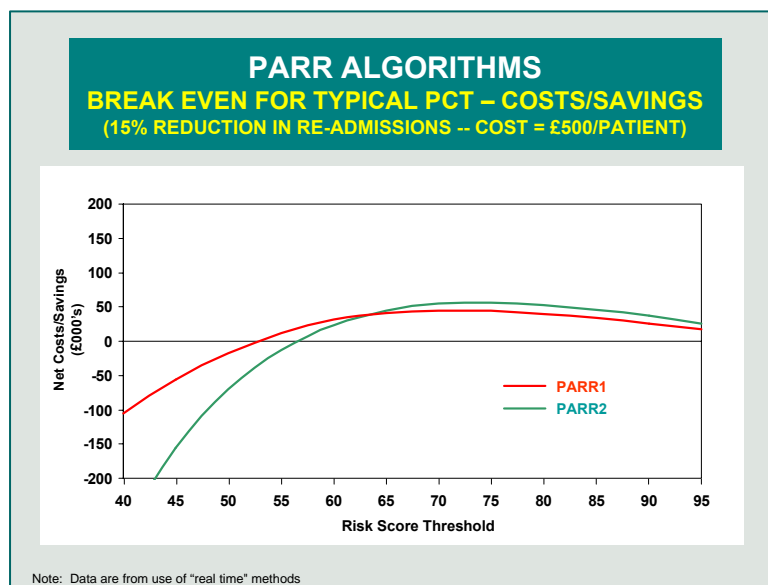
Exhibit 2



An important goal of the algorithms is to identify or “flag” as many patients as possible who will be re-admitted in the subsequent 12 months, while minimising the number of patients flagged who would not be admitted (false positives). Limiting the number of these false positives is important because if case management or other intervention resources are used for these patients, there is no “payback” from reduced rates of future hospitalisations. The reduction in future hospitalisations is critical to making a “business case” for interventions. While improving patient health status with case management may be clearly desirable in itself, with restricted funds available for interventions, there is usually an expectation that the costs of the intervention can be largely offset by reductions in future hospital admissions (especially when PCT payments to hospitals are made on a per admission basis under Payment by Results).

In developing the algorithm, it was possible to test the “business case” for various risk score thresholds. Because the PARR1 algorithm is somewhat more accurate than the PARR2 algorithm in finding patients who are admitted, it breaks even at a lower risk score threshold. For example, assuming an intervention cost of £500 and 15% reduction in future hospitalisations for patients enrolled in an intervention, the break even levels for PARR1 and PARR2 using the “real time” method are illustrated in Exhibit 3 (for a typical PCT with 9,000 patients with emergency admissions in a year).

Exhibit 3



Of course, this business case modelling is enormously sensitive to the assumptions included in the analysis, particularly the cost of the intervention and the rate of anticipated reductions in hospital admissions. In Exhibits 4-7 below, using the “real time” approach, various assumptions about intervention costs (£500, £750, and £1,000 per patient) and reductions in hospital admissions (10%, 15%, and 20%) for patients identified by the PARR2 algorithm are modelled for a typical PCT (with 9,000 patients admitted annually for emergencies). The assumptions on cost per admission

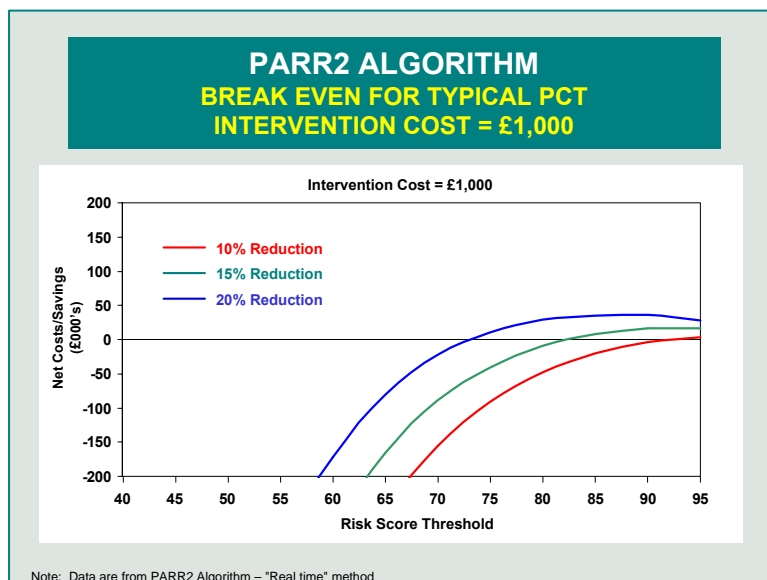
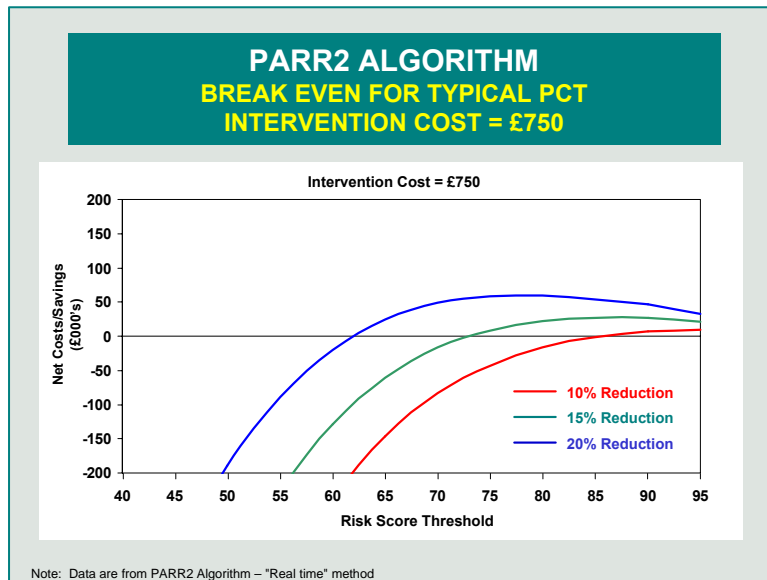
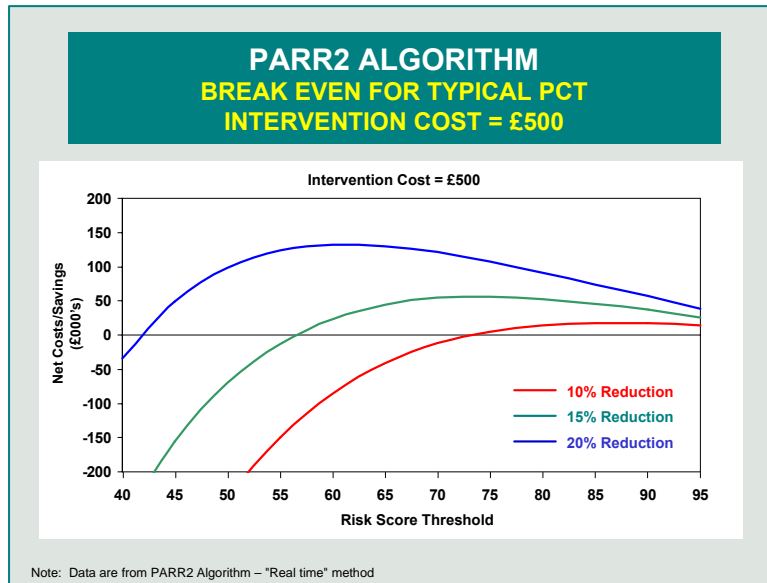
(£2,100) and admission rates per patient at the three threshold levels are based on actual HES data.

This analysis can help SHAs and PCTs understand the potential feasibility of an intervention if it can achieve moderate levels of success in reducing hospital admissions. Exhibit 4 documents the number of patients identified by the PARR2 algorithm at three threshold levels who will have a subsequent emergency admission in the next 12 months, as well as the number of patients misidentified by the algorithm (patients who will not have an emergency admission in the next 12 months). With an intervention cost at £500, the intervention would break even at most threshold levels above 50 and for most assumptions about impact. But at a cost of £750, break even is limited to a risk score threshold of 75+ and intervention impact of 15% or 20%. At an intervention cost of £1,000, only a risk score threshold level of 75+ with a 20% reduction in future admissions achieves break even. For more detailed modelling at various risk threshold levels for “real time” approaches for PARR2 see Exhibits 5-7, and see Appendix C for details on PARR1 and PARR2 for “real time” and monthly and annual archival methods.

Exhibit 4

PARR2 Algorithm - "Real Time" Method Typical PCT (9,000 Patients Annually with Emergency Admissions)							
Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Re-Admitted Patients Identified (Correctly)	Number of Non-Re-Admitted Patients Flagged (Incorrectly)	Total Intervention Cost (£500/Pat)	Adms w/in 12mos for Correctly Identified Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
Intervention Cost = £500/Patient							
50	10%	709	442	£575,787	2.26	£337,259	£238,528
60	10%	410	198	£303,929	2.53	£218,244	£85,685
75	10%	150	44	£96,809	3.25	£102,071	£5,262
50	15%	709	442	£575,787	2.26	£505,888	£69,899
60	15%	410	198	£303,929	2.53	£327,366	£23,437
75	15%	150	44	£96,809	3.25	£153,107	£56,298
50	20%	709	442	£575,787	2.26	£674,517	£98,730
60	20%	410	198	£303,929	2.53	£436,488	£132,559
75	20%	150	44	£96,809	3.25	£204,142	£107,333
Intervention Cost = £750/Patient							
50	10%	709	442	£863,681	2.26	£337,259	£526,422
60	10%	410	198	£455,893	2.53	£218,244	£237,649
75	10%	150	44	£145,214	3.25	£102,071	£43,143
50	15%	709	442	£863,681	2.26	£505,888	£357,793
60	15%	410	198	£455,893	2.53	£327,366	£128,527
75	15%	150	44	£145,214	3.25	£153,107	£7,893
50	20%	709	442	£863,681	2.26	£674,517	£189,163
60	20%	410	198	£455,893	2.53	£436,488	£19,405
75	20%	150	44	£145,214	3.25	£204,142	£58,929
Intervention Cost = £1,000/Patient							
50	10%	709	442	£1,151,574	2.26	£337,259	£814,316
60	10%	410	198	£607,857	2.53	£218,244	£389,613
75	10%	150	44	£193,618	3.25	£102,071	£91,547
50	15%	709	442	£1,151,574	2.26	£505,888	£645,686
60	15%	410	198	£607,857	2.53	£327,366	£280,491
75	15%	150	44	£193,618	3.25	£153,107	£40,512
50	20%	709	442	£1,151,574	2.26	£674,517	£477,057
60	20%	410	198	£607,857	2.53	£436,488	£171,369
75	20%	150	44	£193,618	3.25	£204,142	£10,524

Exhibits 5-7



CHARACTERISTICS OF PATIENTS IDENTIFIED BY THE ALOGRITHM

The PARR case finding algorithms do not identify patients randomly. By the nature of the data used and the design of the algorithms, patients flagged by the algorithms with high risk scores have distinctive characteristics. Since there are no “off-the-shelf” intervention strategies available to improve management of these high risk patients, it is important to understand their characteristics in developing effective strategies to improve care and management of these patients. In Exhibit 8-11, the characteristics of patients flagged by the PARR2 algorithm (“real time” method) with risk scores of 50+ and 75+ and are compared to patients for all emergency admissions in England. Comparable results were obtained for the “real time” PARR1 algorithm and for PARR1 and PARR2 using the annual and monthly archival methods.

In Exhibit 8, demographic characteristics are displayed. Not surprisingly, flagged patients are significantly older than typical emergency admission patients. However, it is important to also note that a not insignificant share are under age 65 (10-17%), and these patients may need different services and management interventions than older patients. There are no significant differences by gender, but the variance in racial/ethnic mix should be explored further (although may be related to incomplete or inaccurate coding of ethnicity in discharge data).

Exhibit 8

	% Patients All Emergency Admissions	% Patients PARR2 Risk Score 50+	% Patients PARR2 Risk Score 75+
Age 0-17	14.5%	3.0%	6.9%
Age 18-39	22.1%	6.8%	10.5%
Age 40-64	23.6%	17.7%	20.0%
Age 65-74	12.5%	18.9%	17.8%
Age 75+	27.0%	53.6%	44.8%
Female	51.6%	50.8%	48.4%
Ethnicity White	59.9%	72.3%	74.9%
Ethnicity Non-White/Other	40.1%	27.7%	25.1%

Some of the most dramatic differences between flagged patients and all emergency patients are related to diagnostic characteristics. The levels of chronic disease among flagged patients is substantially higher than for all emergency patients for most chronic disease categories examined. For flagged patients, 75-80% had multiple chronic diseases, compared with only 35% for all emergency admission patients. This indicates the importance of an intervention strategy that is not limited to treatment or management of a single disease (the approach often employed in U.S. disease management initiatives), requiring a more comprehensive approach to disease management that takes into account these multiple conditions. There were also interesting differences for other conditions that may relate to the design of any intervention. Flagged patients had substantially higher levels of anaemia (16-24% vs 5%), suggesting attention will be required to these issues. Mental illness was also

higher among flagged patients (19-27% vs 8%), and effective interventions will have be designed to cope with these problems. See Exhibit 9.

Exhibit 9

	% Patients All Emergency Admissions	% Patients PARR2 Risk Score 50+	% Patients PARR2 Risk Score 75+
Angina	7.7%	22.9%	33.9%
Asthma	7.2%	14.6%	23.3%
Cerebrovascular disease (CVD)	5.6%	13.0%	13.6%
Congestive heart failure	5.4%	23.4%	32.0%
Connective Tissue Disease/Rheumatoid Arthritis	1.6%	4.6%	5.6%
COPD	5.1%	23.5%	33.7%
Diabetes	7.3%	20.5%	26.4%
Hypertension	14.2%	33.0%	38.1%
Ischaemic heart disease	10.3%	31.2%	41.7%
Liver disease	0.4%	2.0%	3.7%
Peripheral vascular disease	2.3%	8.6%	11.9%
Renal failure	2.7%	11.0%	18.1%
Sickle cell disease	0.2%	0.4%	1.0%
Multiple chronic diseases	34.9%	74.6%	79.8%
Alcohol abuse	3.0%	8.1%	12.4%
Anaemia	4.8%	16.3%	24.1%
Atrial fibrillation	7.1%	21.0%	24.9%
Cancer	9.4%	28.1%	29.1%
Congenital defects	1.8%	3.2%	5.7%
Developmental disability	0.6%	1.4%	2.7%
Drug abuse	0.9%	1.9%	3.8%
HIV/AIDS	0.0%	0.0%	0.0%
Injury/Fall	10.2%	16.0%	19.3%
Mental illness	8.2%	19.4%	26.8%

Of course, there are also substantial differences in prior utilisation. The high level of prior utilisation among flagged patients is a function of the importance of these utilisation patterns in predicting future use. As shown in Exhibit 10, flagged patients averaged 1.06 (risk score 50+) to 2.92 (risk score 75+) emergency admissions in the previous year (51%-84% having at least 1 admission). Patients with a risk score of 50+ had 3.8 in the prior 3 years and patients with risk scores of 75+ had an astounding 9.5 admissions in the prior 3 years compared to 0.8 for all patients with an emergency

Exhibit 10

	% Patients All Emergency Admissions	% Patients PARR2 Risk Score 50+	% Patients PARR2 Risk Score 75+
Number emergency admissions prior 90 days	0.03	0.17	0.51
Number emergency admissions prior 180 days	0.08	0.44	1.27
Number emergency admissions prior 365 days	0.20	1.06	2.92
Number emergency admissions prior 3 years	0.85	3.81	9.47
Number non-emergency admissions prior 3 years	0.54	1.43	2.37
Number of "reference" admissions prior 3 years	0.18	1.11	2.96
Percent with emergency admission prior 90 days	2.3%	12.0%	29.0%
Percent with emergency admission prior 180 days	5.4%	25.9%	54.2%
Percent with emergency admission prior 365 days	12.3%	50.5%	83.9%
Percent with emergency admission prior 3 years	34.0%	90.0%	99.9%
Percent with "reference" admission prior 3 years	9.1%	47.1%	68.0%
Percent with emergency admission next 12 months	29.7%	61.6%	77.3%
Number of emergency admissions next 12 months	0.51	1.39	2.51

admission. This indicates that flagged patients are likely to have serious problems that will require substantial improvements in services and management to reduce admissions. For all flagged patients (including both true positives and false positives), there was an average of 1.4 (risk score 50+) to 2.5 (risk score 75+) admissions in the next 12 months compared to 0.5 for all emergency patients. For correctly flagged patients (i.e. true positives - patients who did have an admission in the next 12 months), the average was 2.3 to 3.3 emergency admissions in the next 12 months (not shown in exhibit). This is important in analysing the “business case” for any intervention because it is reduction in this rate that can help offset the cost of the intervention as discussed above.

Another important characteristic of patients flagged by the algorithms is that a large percentage die in hospital in the 12 months following the triggering admission. As shown in Exhibit 11, these rates of death are comparatively high across all age groups, with 21% of flagged patients with risk scores of 50+ who are age 75 or older dying in the next 12 months (and 26% of patients with risk scores of 75+). This has two significant implications for any intervention strategy. First, a critical component of the intervention will clearly need to involve end of life care and counselling. Large differences in utilisation of care at the end-of-life have been documented in research in the U.S., and evidence suggests that these differences are not driven by patient preferences about care, but rather by physician practice style (treatment aggressiveness).⁴ Accordingly, an effective intervention will undoubtedly include some mechanism for helping patients make end-of-life decisions, with choices driven by patient preferences likely to involve consumption of less inpatient care rather than more. A second important implication relates to the cost of the intervention. To the extent that interventions are priced on an expected period of service delivery (e.g. 12 months), patients who die during the 12 months following the “reference” admission will obviously require services for a shorter period, and pricing policies should reflect these circumstances.

Exhibit 11

	% Patients All Emergency Admissions	% Patients PARR2 Risk Score 50+	% Patients PARR2 Risk Score 75+
% Patients who die in next 12 months			
Age 0-17	0.1%	2.5%	3.6%
Age 18-39	0.3%	2.2%	2.2%
Age 40-64	2.8%	10.9%	12.9%
Age 65-74	7.6%	17.5%	22.0%
Age 75+	11.2%	20.5%	25.5%
All ages	4.8%	16.4%	18.4%

HOW CAN THE ALGORITHMS BE USED IN PRACTICE?

Use of the Algorithms in “Real Time”

As noted above, the PARR1 and PARR2 algorithms were designed primarily to be used in real time to identify the level of risk of re-hospitalisation for patients who have been hospitalised for a “reference” condition. To use the algorithm in this manner, the following are required:

- Three or more years of inpatient data for the population served by the PCT (ClearNet Admitted Patient Care [APC] data) that include NHS patient identifiers;
- Information on currently hospitalised PCT patients as they are admitted (including NHS patient identifiers and, for the PARR1 algorithm, preliminary diagnostic information);
- The PARR1 and PARR2 case finding algorithm programme (available from the NHS) and Microsoft Access software.

Full details and instructions for using the PARR case finding algorithms in “real time” are provided in Appendix D. It is recommended that the information on admissions for the relevant population be obtained on a daily basis from area hospitals to enable the intervention, if appropriate, to begin while the patient is hospitalised (to incorporate effective discharge planning and community based resource allocation in the intervention). As described above, the software will produce a risk score for each admitted patient. Patients can be assigned to the intervention based on whatever policies are adopted by the PCT or SHA for a minimum risk score threshold. If application of “business case” principles are an important consideration in use of the algorithm, it is suggested that a minimum threshold of 50-70 be adopted. Enrolling patients as they are hospitalised would allow the intervention to have a gradual start-up to calibrate the programme as more is learned about these patients. It is anticipated that in using this “real time” approach, the PARR1 algorithm would flag 600-650 patients per year for the typical PCT, and PARR2 would flag 1,100 to 1,200 patients per year per PCT. Discussion of trade-offs among the different approaches is discussed below.

Use of the Algorithms with Archival Data Only

The PARR algorithms were also adapted to be used with archival data alone. These approaches require three or more years of inpatient data for area residents (ClearNet Admitted Patient Care [APC] data) that include NHS patient identifiers, but do not require daily updates for recent hospitalisations. There are two archival approaches that can be used:

- **Monthly updated analysis** – This approach requires down loading ClearNet APC data on a monthly basis to obtain admissions for the population served by the PCT for the prior month. These data are analysed to identify patients with admissions for “reference” conditions (PARR1) or any emergency admission (PARR2) in the past month, and then archived data (from previous monthly downloads and from the three-year data base) are examined to

produce a risk score for patients admitted that month. Instructions are contained in Appendix D.

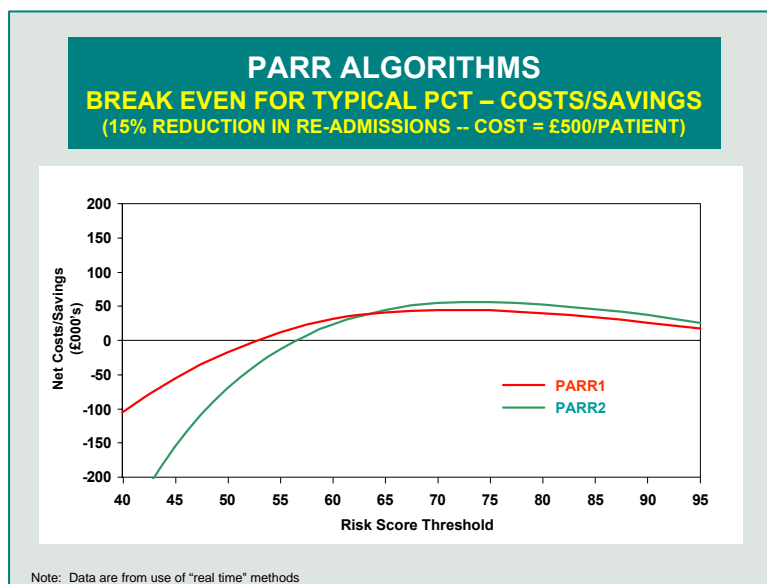
- Annual analysis – This approach involves analysis of the most recent year’s archived data to identify patients who have had at least one admission for a “reference” condition (PARR1) or any emergency admission (PARR2) in the last year, and then examines the other archived data to create a “risk score” for the probability of re-hospitalisation for these patients in the next year. Instructions are provided in Appendix D.

Which Approach is Best for Your PCT or SHA?

PARR1 vs. PARR2

The PARR1 algorithm is limited to patients with a recent admission for a “reference” condition. The intent was to focus the algorithm on patients with conditions that often result in a re-admission and where timely and effective ambulatory care, case management, or social services can help reduce the risks of hospitalisation. Because of this focus, the PARR1 algorithm has a lower rate of “false positives” and breaks even at a somewhat lower risk score level than PARR2. See Exhibit 12 which compares performance of the algorithms using the “real time method”, with an assumption of a 15% reduction in future admissions and an intervention cost of £500 per patient.

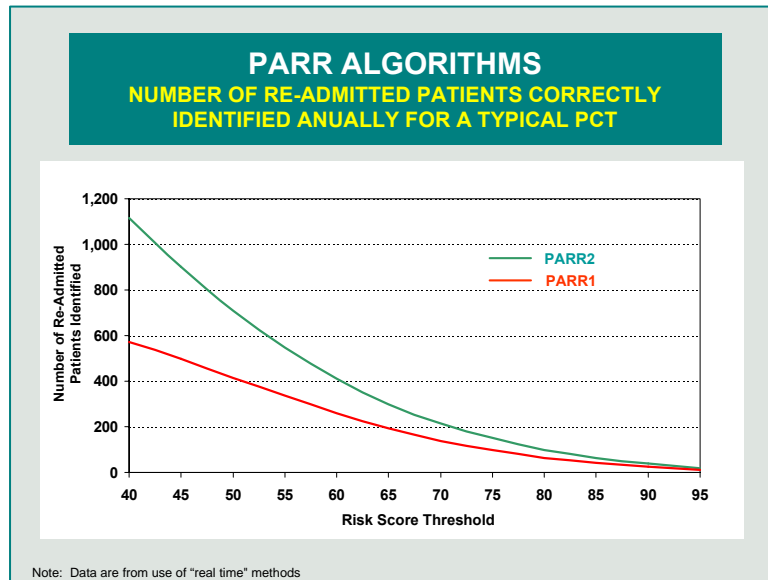
Exhibit 12



However, the PARR2 approach has two distinct advantages. First, it does not require information on the admitting diagnosis of the patient (any emergency admission is the triggering event), which makes it more practicable for use in “real time” for most PCTs since patient diagnoses can be difficult to obtain prior to discharge, especially using ICD10 codes which are often completed by medical record staff. Secondly, the PARR2 algorithm, while slightly less efficient (more false positives), finds many

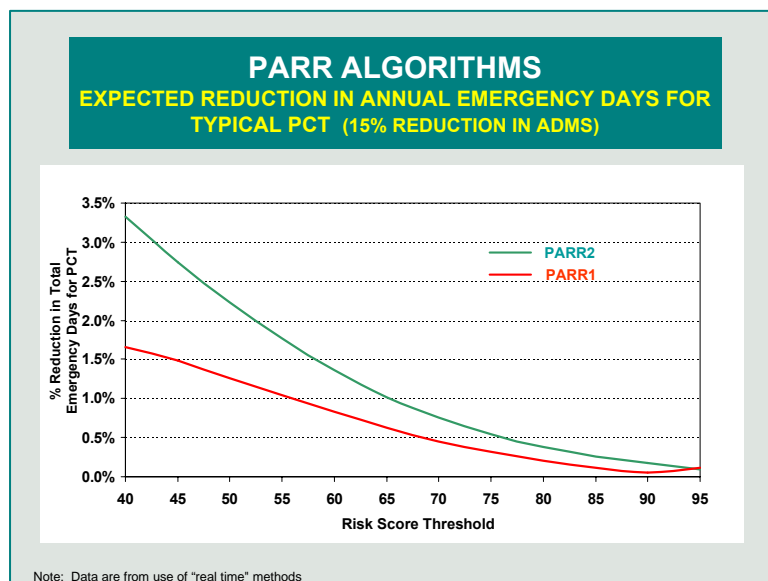
more patients than PARR1 since it is not restricted to patients who have had a recent admission for a “reference condition”. See Exhibit 13 which shows the number of correctly identified patients for the typical sized PCT.

Exhibit 13



The ability to find larger numbers of patients may be important to PCTs and SHAs interested in using interventions for improving management of health and social care for high risk patients as an important component of efforts to help meet the mandate of reducing emergency bed days by 5% by 2008. The PARR2 algorithm, because it finds more patients, has a greater potential to reduce emergency bed days. For example, using the “real time” method and assuming an impact of a 15% reduction in bed days for flagged patients, the use of PARR2 algorithm could reduce emergency patient days by almost 2.3% compare to 1.3% for PARR1. See Exhibit 14.

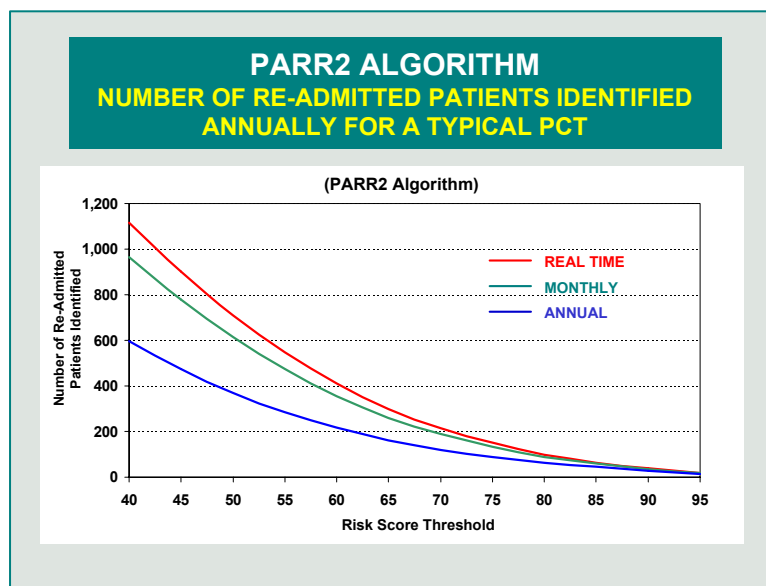
Exhibit 14



“Real Time” vs. Monthly or Annual Archival Methods

The archival approaches were developed to give flexibility to PCTs, especially where obtaining data in “real time” for current hospitalisations is difficult or unfeasible. There are advantages and disadvantages with any of these methods. There are two main advantages of the “real time” approach. First, because the patient is in the hospital, it enables the intervention to incorporate more effective discharge planning to arrange and coordinate care in the community. There is a rich literature documenting the importance of effective discharge planning,⁵ and it is likely to be important to an effective intervention for these high risk patients. Secondly, the “real time” approach also finds a larger number of patients who will be admitted in the next 12 months than do the archival methods (especially the annual analysis approach) – see Exhibit 15 that illustrates the differences for the PARR2 algorithm. Many re-admissions occur fairly soon after the initial admission, and delays in identifying patients can result in a less effective intervention (since the flagged patient may already have been re-admitted). This problem is less acute with the monthly archival approach, but is significant with the annual archival approach.

Exhibit 15



The main disadvantage of the “real time” method is the level of effort required. First, it requires the downloading of data on recent admissions on a daily basis. This requires staff knowledgeable in use of ClearNet data and comfortable in preparing it for use with the algorithm. Secondly, for use with the PARR1 algorithm, data on admitting diagnoses are required. As noted above, obtaining diagnostic information on patients’ prior discharge can be problematic with some hospitals and is likely to rely on use of an admitting diagnosis field which many consider less reliable than discharge data entered by medical records staff. This problem does not exist with the PARR2 algorithm since it does not require information on the admitting diagnosis for use in “real time” (requiring only the NHS number for patients admitted on an emergency basis). However, a limitation of the real time method for PARR2 is that it is looking at all emergency admissions, including accidents and injuries that have only a small chance of readmission. Accordingly, PARR2 real time has a larger share

of patients with very low risk scores (below 20 or 30), and users are likely to want to focus on patients with high risk scores.

The monthly update approach is nearly as effective as the “real time” method in finding patients and does not require daily down loading and analysis, but generally would not allow the intervention to begin during the “reference” hospitalisation (with a team assessment of the patient during the stay, improved discharge planning, etc.).

The archival approach using an annual analysis is, of course, the easiest to implement, and permits identification of a large number of patients at the outset (of possible interest to programmes during start up phases). However, this method is somewhat less effective in predicting risk of future admissions. For example, at a risk score threshold of 50, it finds only about 368 patients who will be admitted in the next 12 months (for a typical PCT) compared to 709 with the “real time” approach and 614 with the monthly archival approach. It also has a somewhat higher level of false positives (identifying patients who are not admitted in the next twelve months), and this lower precision also means that the annual archival approach tends to flag patients who are somewhat sicker (have higher expected future admissions). See Exhibit 16 that compares the three methods (as well as the “threshold” approach used in a recent UK demonstration) for a typically sized PCT.

Exhibit 16

PARR2 Algorithm - Alternative Methods Typical PCT (9,000 Patients Annually with Emergency Admissions)							
Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Re-Admitted Patients Identified (Correctly)	Number of Non-Re-Admitted Patients Flagged (Incorrectly)	Total Intervention Cost (£500/Pat)	Adms w/in 12mos for Correctly Identified Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
"Real Time" Model							
50	15%	709	442	£575,787	2.26	£505,888	£69,899
60	15%	410	198	£303,929	2.53	£327,366	£23,437
75	15%	150	44	£96,809	3.25	£153,107	£56,298
Monthly Update Model							
50	15%	614	392	£503,160	2.36	£456,995	£46,164
60	15%	353	176	£264,447	2.68	£297,843	£33,396
75	15%	133	39	£85,999	3.45	£144,584	£58,585
Annual Archival Model							
50	15%	368	242	£305,306	2.62	£304,454	£851
60	15%	217	107	£161,976	3.03	£206,635	£44,659
75	15%	89	29	£58,838	3.98	£110,950	£52,112
"Threshold" Approach - 2 Admissions Last Year - Age 65+							
n/a	10%	402	798	£600,000	2.00	£168,444	£431,556
n/a	15%	402	798	£600,000	2.00	£252,667	£347,333
n/a	20%	402	798	£600,000	2.00	£336,889	£263,111
n/a	36%	402	798	£600,000	2.00	£600,000	£0

NEXT STEPS IN IMPLEMENTING EFFECTIVE INTERVENTIONS

In the short and medium term, it is not possible to have a complete, detailed understanding of the design requirements for interventions. As evidenced from previous sections, a significant amount is known about the characteristics of these patients. The kinds of conditions for which these patients are re-admitted are, indeed, suggestive that there is substantial potential for reducing future admissions (see Exhibit 17 that displays the most common diagnoses of re-admissions for patients flagged by PARR2). However, there is also an enormous amount of important information that is not known. What are the specific factors that led to any recent potentially preventable/avoidable admission? Was it inadequate medical care? Lack of knowledge about identifying symptoms or warning signs of an acute episode of a chronic illness? Lack of knowledge about how to respond to such signs? Lack of confidence or motivation in self management? Social or personal factors that interfere with effective self management or optimal care seeking behaviour? Answers to these questions will be important in crafting an effective intervention strategy.

Exhibit 17

Top 25 Primary Diagnoses For Re-Admitted Patients - PARR2 - Monthly Method				
ICD10 Code	Description	% of Readmits	Cumulative %	
J441	COPD with acute exacerbation unspecified	4.4%	4.4%	
J440	COPD with acute lower resp infection	3.2%	7.6%	
R074	Chest pain unspecified	3.1%	10.7%	
I500	Congestive heart failure (CHF)	2.7%	13.4%	
R69X	Unknown and unspecified causes of morbidity	2.5%	15.9%	
J22X	Unspecified acute lower respiratory infection	2.5%	18.4%	
I200	Unstable angina	2.2%	20.5%	
N390	Urinary tract infection site not specified	1.8%	22.4%	
I501	Left ventricular failure	1.6%	24.0%	
I209	Angina pectoris unspecified	1.5%	25.5%	
R104	Other and unspecified abdominal pain	1.3%	26.7%	
G409	Epilepsy unspecified	1.2%	28.0%	
J181	Lobar pneumonia unspecified	1.2%	29.1%	
R55X	Syncope and collapse	1.1%	30.2%	
I48X	Atrial fibrillation and flutter	1.1%	31.3%	
J189	Pneumonia unspecified	1.1%	32.3%	
J459	Asthma unspecified	1.0%	33.3%	
K529	Noninfective gastroenteritis and colitis unspecified	1.0%	34.3%	
C349	Malignant neoplasm of bronchus or lung unspec	0.9%	35.3%	
R073	Other chest pain	0.9%	36.1%	
R11X	Nausea and vomiting	0.9%	37.0%	
J449	Chronic obstructive pulmonary disease unspecified	0.8%	37.8%	
D570	Sickle-cell anaemia with crisis	0.7%	38.6%	
R54X	Senility	0.7%	39.3%	
L031	Cellulitis of other parts of limb	0.7%	40.0%	

It is also not completely clear the types of intervention strategies that are likely to be most effective for the patients flagged by the algorithm. Undoubtedly, any intervention will require flexibility to match specific elements of the strategy to the particular needs of each patient. One size does not fit all, and finding the least intrusive, least costly strategies possible for each patient will be key to a successful programme. Clearly, some assessment by a team that includes both clinical and social service expertise while the patient is hospitalised would be ideal. Coordination of medical care, social care, and community resources will certainly be required in many cases. If the patient has one or more chronic diseases, the intervention is likely to

include elements of Chronic Care Model designed by Wagner *et al.* involving a collaborative team approach to chronic disease (with community, the health system, self-management support, delivery system design, decision support and clinical information system components).⁶ But much more about the characteristics and needs of these patients needs to be learned for effective intervention design.

One approach that might be considered by PCTs or SHAs in moving forward would be to simply interview the first 50 patients (and their providers) flagged by the algorithm to determine the needs of these patients and the factors that contributed to any preventable/avoidable admission. This information could then be incorporated into efforts to design interventions, whether the services are ultimately “made” or “bought” by the PCT/SHA, in the latter case the information being used in developing the specifications for the solicitation of service delivery proposals. Once the intervention has begun, PCTs and SHAs could also consider randomising patients into intervention and non-intervention arms to learn as much as possible about the effectiveness and costs of the intervention.

The PARR algorithms were designed to be used in all of England. They were also tested with a sample of data from individual PCTs, and comparable results were obtained at the individual PCT level. Although it is important to keep in mind that there are substantial differences among PCTs in their demographic characteristics and performance/utilization patterns of their health care delivery systems. Accordingly, in applying the national algorithm to local data, levels of false positives and break even points may vary somewhat across PCTs. PCTs or SHAs interested in a more tailored algorithm where the regression coefficients used to produce the risk scores are specific to the PCT or SHA can obtain the software (SPSS) used to develop the all England algorithm and carry out modelling locally.

REFERENCES

- ¹ See for example, Wennberg JE. Practice variation and health care reform: Connecting the dots. *Health Affairs*. Web Exclusive, October 7, 2004, 140-144.
- ² Roland M, Dusheiko M, Gravelle H, et al. Follow up of people aged 65 and over with a history of emergency admissions: analysis of routine admission data *BMJ* 2005;330:289-292.
- ³ <http://www.cms.hhs.gov/healthplans/rates/> - Note the DCG hierarchical groups are derived from analysis of Medicare data, and application to other population groups necessarily lose some precision.
- ⁴ J. Wennberg, E. Fisher, T. Stukel, et al., "Use of Hospitals, Physician Visits, and Hospice During the Last Six Months of Life among Cohorts Loyal to Highly Respected Hospitals in the United States," *BMJ* 2004;328: 607-610.
- ⁵ Naylor M, Broton D, Cambell R, et al. Comprehensive discharge planning and home follow-up: A randomised clinical trial. *JAMA* 1999;281:613-620
- Philips C, Wright S, Kern D, et al. Comprehensive discharge planning with post discharge support for older patients with congestive heart failure. *JAMA* 2004;291:1358-1367.
- ⁶ See for example, Wagner EH. Chronic disease management: What will it take to improve care for chronic illness? *Effective Clinical Practice*. 1998;1:2-4.

APPENDIX A

"Reference" Conditions	
HRG Code	HRG Name
A18	Multiple Sclerosis or other CNS Demyelinating Cond
A29	Epilepsy >69 or w cc
D16	Bronchiectasis
D17	Cystic Fibrosis
D20	Chronic Obstructive Pulmonary Disease or Bronchiti
D21	Asthma >49 or w cc
D26	Fibrosis or Pneumoconiosis
D33	Other Respiratory Diagnoses >69 or w cc
D99	Complex Elderly with a Respiratory System Primary
E18	Heart Failure or Shock >69 or w cc
E19	Heart Failure or Shock <70 w/o cc
E22	Coronary Atherosclerosis >69 or w cc
E29	Arrhythmia or Conduction Disorders >69 or w cc
E33	Angina >69 or w cc
E99	Complex Elderly with a Cardiac Primary Diagnosis
F36	Large Intestinal Disorders >69 or w cc
G25	Chronic Pancreatic Disease <70
H25	Inflammatory Spine, Joint or Connective Tissue Dis
J38	Skin Ulcers
K11	Diabetes with Hypoglycaemic Emergency >69 or w cc
K13	Diabetes with Hyperglycaemic Emergency >69 or w cc
K17	Diabetes with Lower Limb Complications
K99	Complex Elderly with an Endocrine or Metabolic Sys
L09	Kidney or Urinary Tract Infections >69 or w cc
P02	Cystic Fibrosis
P23	Blood Cell Disorders
P25	Cardiac Conditions
Q17	Peripheral Vascular Disease >69 or w cc
S04	Coagulation Disorders
S05	Red Blood Cell Disorders >69 or w cc
S06	Red Blood Cell Disorders <70 w/o cc
T01	Senile Dementia

APPENDIX B

Variables Included in Initial Logistic Regressions

Patient characteristics

Age 0-17
Age 40-64
Age 65-74
Age 75+
Gender
Ethnicity - Black
Ethnicity - Indian
Ethnicity - Pakistani
Ethnicity - White
Ethnicity - Unknown/not specified

Ward Characteristics

Percent Ward Bangladeshi
Percent Ward Indian
Percent Ward Other Asian
Percent Ward Pakistani
Percent Ward Black African
Percent Ward Black Caribbean
Percent Ward Black Other
Percent Ward Chinese
Percent Ward African mix
Percent Ward Asian mix
Percent Ward Caribbean mix
Percent Ward Other mix
Percent Ward Non-British White
Percent Ward White Irish
Percent Ward White Other
Ward Deprivation Index
Observed/expected ratio for MD practice style sensitive admissions in ward of residence
Observed/expected ratio for rate of rehospitalizations for hospital of current admission

(more)



APPENDIX B (Continued)

Variables Included in Initial Logistic Regressions

Patient's current or prior diagnoses:

Alcohol abuse
Anaemia
Angina
Asthma
Atrial fibrillation
Cancer
Cerebrovascular disease (CVD)
Congenital disability
Congestive heart failure (CHF)
Connective tissue disease/rheumatoid arthritis
Chronic obstructive pulmonary disease (COPD)
Development disabilities
Diabetes
Diagnostic Cost Groups/Hierarchical Condition Category - (172 categories)
Drug abuse
HIV/AIDS
Hypertension
Injury from fall
Ischaemic heart disease
Liver disease
Mental illness
Peripheral vascular disease
Renal Failure
Sickle cell disease

Patient's prior Utilisation

Prior "reference" condition emergency admission
Prior "reference" condition diagnosis emergency
Prior "reference" condition non-emergency admission
Prior "reference" condition diagnosis non-emergency
Number of emergency admission in the previous 90 days
Number of emergency admission in the previous 90 days - reference condition
Number of non-emergency admission in the previous 90 days
Number of emergency admission in the previous 180 days
Number of emergency admission in the previous 180 days - reference condition
Number of non-emergency admission in the previous 180 days
Number of emergency admission in the previous 365 days
Number of emergency admission in the previous 365 days - reference condition
Number of non-emergency admission in the previous 365 days
Total number of prior emergency admissions in previous 3 years
Number of non-emergency admission in the previous 3 years
Prior admission for respiratory Infection
Prior admission for ambulatory care sensitive condition
Number of non-emergency admission in the previous 3 years
Average number of episodes per spell for emergency admissions
Average number of episodes per spell for non-emergency admissions
Number of different treatment specialists seen

APPENDIX C

**PARR1 AND PARR2
“BUSINESS CASE” MODELLING
WITH VARIOUS ASSUMPTIONS ABOUT
INTERVENTIION COST AND IMPACT**

PARR1 "Real Time" Model Intervention Cost = £500

Business Case Modelling Using PARR1 Algorithm
"Real Time" Model - Intervention Cost = £500
Typical PCT - 1,500 Patients with "Reference" Admissions Per Year

Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£500/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	734	100.0%	766	51.1%	£749,833	2.00	£308,423	£441,410
5	10%	734	100.0%	766	51.1%	£749,693	2.00	£308,423	£441,270
10	10%	734	100.0%	766	51.1%	£749,693	2.00	£308,423	£441,270
15	10%	733	100.0%	765	51.1%	£749,273	2.00	£308,371	£440,901
20	10%	733	99.9%	758	50.9%	£745,194	2.00	£308,144	£437,050
25	10%	724	98.7%	718	49.8%	£721,088	2.01	£305,438	£415,650
30	10%	695	94.8%	639	47.9%	£667,152	2.03	£296,843	£370,310
35	10%	640	87.2%	519	44.8%	£579,272	2.08	£279,733	£299,539
40	10%	572	78.0%	410	41.7%	£490,832	2.14	£257,419	£233,414
45	10%	498	67.9%	310	38.4%	£404,003	2.22	£231,707	£172,296
50	10%	415	56.6%	223	35.0%	£319,011	2.31	£201,356	£117,656
55	10%	336	45.9%	154	31.4%	£245,224	2.43	£171,644	£73,579
60	10%	259	35.4%	102	28.2%	£180,679	2.59	£141,330	£39,349
65	10%	194	26.4%	64	24.9%	£129,177	2.79	£113,692	£15,485
70	10%	139	18.9%	39	22.0%	£88,843	3.06	£89,076	£233
75	10%	96	13.2%	23	18.9%	£59,503	3.40	£68,937	£9,434
80	10%	64	8.8%	12	16.3%	£38,373	3.85	£51,997	£13,624
85	10%	41	5.6%	6	12.7%	£23,370	4.46	£38,182	£14,811
90	10%	24	3.2%	2	9.5%	£13,094	5.20	£25,896	£12,801
95	10%	12	1.6%	1	4.5%	£6,180	6.53	£16,168	£9,989
0	15%	734	100.0%	766	51.1%	£749,833	2.00	£462,634	£287,199
5	15%	734	100.0%	766	51.1%	£749,693	2.00	£462,634	£287,059
10	15%	734	100.0%	766	51.1%	£749,693	2.00	£462,634	£287,059
15	15%	733	100.0%	765	51.1%	£749,273	2.00	£462,557	£286,716
20	15%	733	99.9%	758	50.9%	£745,194	2.00	£462,215	£282,979
25	15%	724	98.7%	718	49.8%	£721,088	2.01	£458,157	£262,932
30	15%	695	94.8%	639	47.9%	£667,152	2.03	£445,264	£221,888
35	15%	640	87.2%	519	44.8%	£579,272	2.08	£419,600	£159,672
40	15%	572	78.0%	410	41.7%	£490,832	2.14	£386,128	£104,704
45	15%	498	67.9%	310	38.4%	£404,003	2.22	£347,560	£56,442
50	15%	415	56.6%	223	35.0%	£319,011	2.31	£302,034	£16,978
55	15%	336	45.9%	154	31.4%	£245,224	2.43	£257,466	£12,243
60	15%	259	35.4%	102	28.2%	£180,679	2.59	£211,995	£31,316
65	15%	194	26.4%	64	24.9%	£129,177	2.79	£170,538	£41,361
70	15%	139	18.9%	39	22.0%	£88,843	3.06	£133,613	£44,771
75	15%	96	13.2%	23	18.9%	£59,503	3.40	£103,406	£43,903
80	15%	64	8.8%	12	16.3%	£38,373	3.85	£77,995	£39,622
85	15%	41	5.6%	6	12.7%	£23,370	4.46	£57,272	£33,902
90	15%	24	3.2%	2	9.5%	£13,094	5.20	£38,843	£25,749
95	15%	12	1.6%	1	4.5%	£6,180	6.53	£24,252	£18,073
0	20%	734	100.0%	766	51.1%	£749,833	2.00	£616,846	£132,987
5	20%	734	100.0%	766	51.1%	£749,693	2.00	£616,846	£132,847
10	20%	734	100.0%	766	51.1%	£749,693	2.00	£616,846	£132,847
15	20%	733	100.0%	765	51.1%	£749,273	2.00	£616,743	£132,530
20	20%	733	99.9%	758	50.9%	£745,194	2.00	£616,287	£128,907
25	20%	724	98.7%	718	49.8%	£721,088	2.01	£610,876	£110,213
30	20%	695	94.8%	639	47.9%	£667,152	2.03	£593,685	£73,467
35	20%	640	87.2%	519	44.8%	£579,272	2.08	£559,467	£19,806
40	20%	572	78.0%	410	41.7%	£490,832	2.14	£514,837	£24,005
45	20%	498	67.9%	310	38.4%	£404,003	2.22	£463,414	£59,411
50	20%	415	56.6%	223	35.0%	£319,011	2.31	£402,711	£83,700
55	20%	336	45.9%	154	31.4%	£245,224	2.43	£343,289	£98,065
60	20%	259	35.4%	102	28.2%	£180,679	2.59	£282,660	£101,981
65	20%	194	26.4%	64	24.9%	£129,177	2.79	£227,384	£98,207
70	20%	139	18.9%	39	22.0%	£88,843	3.06	£178,151	£89,308
75	20%	96	13.2%	23	18.9%	£59,503	3.40	£137,874	£78,371
80	20%	64	8.8%	12	16.3%	£38,373	3.85	£103,994	£65,621
85	20%	41	5.6%	6	12.7%	£23,370	4.46	£76,363	£52,993
90	20%	24	3.2%	2	9.5%	£13,094	5.20	£51,791	£38,697
95	20%	12	1.6%	1	4.5%	£6,180	6.53	£32,336	£26,157

PARR1 "Real Time" Model Intervention Cost = £750

Business Case Modelling Using PARR1 Algorithm
"Real Time" Model - Intervention Cost = £750
Typical PCT - 1,500 Patients with "Reference" Admissions Per Year

Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£750/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	734	100.0%	766	51.1%	£1,124,750	2.00	£308,423	-£816,327
5	10%	734	100.0%	766	51.1%	£1,124,540	2.00	£308,423	-£816,117
10	10%	734	100.0%	766	51.1%	£1,124,540	2.00	£308,423	-£816,117
15	10%	733	100.0%	765	51.1%	£1,123,909	2.00	£308,371	-£815,538
20	10%	733	99.9%	758	50.9%	£1,117,791	2.00	£308,144	-£809,647
25	10%	724	98.7%	718	49.8%	£1,081,632	2.01	£305,438	-£776,195
30	10%	695	94.8%	639	47.9%	£1,000,729	2.03	£296,843	-£703,886
35	10%	640	87.2%	519	44.8%	£868,909	2.08	£279,733	-£589,175
40	10%	572	78.0%	410	41.7%	£736,248	2.14	£257,419	-£478,830
45	10%	498	67.9%	310	38.4%	£606,004	2.22	£231,707	-£374,297
50	10%	415	56.6%	223	35.0%	£478,517	2.31	£201,356	-£277,161
55	10%	336	45.9%	154	31.4%	£367,835	2.43	£171,644	-£196,191
60	10%	259	35.4%	102	28.2%	£271,019	2.59	£141,330	-£129,689
65	10%	194	26.4%	64	24.9%	£193,765	2.79	£113,692	-£80,073
70	10%	139	18.9%	39	22.0%	£133,264	3.06	£89,076	-£44,189
75	10%	96	13.2%	23	18.9%	£89,254	3.40	£68,937	-£20,317
80	10%	64	8.8%	12	16.3%	£57,560	3.85	£51,997	-£5,563
85	10%	41	5.6%	6	12.7%	£35,056	4.46	£38,182	£3,126
90	10%	24	3.2%	2	9.5%	£19,642	5.20	£25,896	£6,254
95	10%	12	1.6%	1	4.5%	£9,269	6.53	£16,168	£6,899
0	15%	734	100.0%	766	51.1%	£1,124,750	2.00	£462,634	-£662,115
5	15%	734	100.0%	766	51.1%	£1,124,540	2.00	£462,634	-£661,905
10	15%	734	100.0%	766	51.1%	£1,124,540	2.00	£462,634	-£661,905
15	15%	733	100.0%	765	51.1%	£1,123,909	2.00	£462,557	-£661,352
20	15%	733	99.9%	758	50.9%	£1,117,791	2.00	£462,215	-£655,576
25	15%	724	98.7%	718	49.8%	£1,081,632	2.01	£458,157	-£623,476
30	15%	695	94.8%	639	47.9%	£1,000,729	2.03	£445,264	-£555,464
35	15%	640	87.2%	519	44.8%	£868,909	2.08	£419,600	-£449,308
40	15%	572	78.0%	410	41.7%	£736,248	2.14	£386,128	-£350,121
45	15%	498	67.9%	310	38.4%	£606,004	2.22	£347,560	-£258,444
50	15%	415	56.6%	223	35.0%	£478,517	2.31	£302,034	-£176,483
55	15%	336	45.9%	154	31.4%	£367,835	2.43	£257,466	-£110,369
60	15%	259	35.4%	102	28.2%	£271,019	2.59	£211,995	-£59,024
65	15%	194	26.4%	64	24.9%	£193,765	2.79	£170,538	-£23,227
70	15%	139	18.9%	39	22.0%	£133,264	3.06	£133,613	£349
75	15%	96	13.2%	23	18.9%	£89,254	3.40	£103,406	£14,151
80	15%	64	8.8%	12	16.3%	£57,560	3.85	£77,995	£20,436
85	15%	41	5.6%	6	12.7%	£35,056	4.46	£57,272	£22,217
90	15%	24	3.2%	2	9.5%	£19,642	5.20	£38,843	£19,202
95	15%	12	1.6%	1	4.5%	£9,269	6.53	£24,252	£14,983
0	20%	734	100.0%	766	51.1%	£1,124,750	2.00	£616,846	-£507,904
5	20%	734	100.0%	766	51.1%	£1,124,540	2.00	£616,846	-£507,694
10	20%	734	100.0%	766	51.1%	£1,124,540	2.00	£616,846	-£507,694
15	20%	733	100.0%	765	51.1%	£1,123,909	2.00	£616,743	-£507,166
20	20%	733	99.9%	758	50.9%	£1,117,791	2.00	£616,287	-£501,504
25	20%	724	98.7%	718	49.8%	£1,081,632	2.01	£610,876	-£470,757
30	20%	695	94.8%	639	47.9%	£1,000,729	2.03	£593,685	-£407,043
35	20%	640	87.2%	519	44.8%	£868,909	2.08	£559,467	-£309,442
40	20%	572	78.0%	410	41.7%	£736,248	2.14	£514,837	-£221,411
45	20%	498	67.9%	310	38.4%	£606,004	2.22	£463,414	-£142,590
50	20%	415	56.6%	223	35.0%	£478,517	2.31	£402,711	-£75,805
55	20%	336	45.9%	154	31.4%	£367,835	2.43	£343,289	-£24,547
60	20%	259	35.4%	102	28.2%	£271,019	2.59	£282,660	£11,641
65	20%	194	26.4%	64	24.9%	£193,765	2.79	£227,384	£33,619
70	20%	139	18.9%	39	22.0%	£133,264	3.06	£178,151	£44,887
75	20%	96	13.2%	23	18.9%	£89,254	3.40	£137,874	£48,620
80	20%	64	8.8%	12	16.3%	£57,560	3.85	£103,994	£46,434
85	20%	41	5.6%	6	12.7%	£35,056	4.46	£76,363	£41,307
90	20%	24	3.2%	2	9.5%	£19,642	5.20	£51,791	£32,149
95	20%	12	1.6%	1	4.5%	£9,269	6.53	£32,336	£23,067

PARR1 "Real Time" Model Intervention Cost = £1,000

Business Case Modelling Using PARR1 Algorithm
"Real Time" Model - Intervention Cost = £1,000
Typical PCT - 1,500 Patients with "Reference" Admissions Per Year

Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£1,000/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	734	100.0%	766	51.1%	£1,499,666	2.00	£308,423	-£1,191,243
5	10%	734	100.0%	766	51.1%	£1,499,386	2.00	£308,423	-£1,190,963
10	10%	734	100.0%	766	51.1%	£1,499,386	2.00	£308,423	-£1,190,963
15	10%	733	100.0%	765	51.1%	£1,498,546	2.00	£308,371	-£1,190,174
20	10%	733	99.9%	758	50.9%	£1,490,388	2.00	£308,144	-£1,182,244
25	10%	724	98.7%	718	49.8%	£1,442,177	2.01	£305,438	-£1,136,739
30	10%	695	94.8%	639	47.9%	£1,334,305	2.03	£296,843	-£1,037,462
35	10%	640	87.2%	519	44.8%	£1,158,545	2.08	£279,733	-£878,811
40	10%	572	78.0%	410	41.7%	£981,665	2.14	£257,419	-£724,246
45	10%	498	67.9%	310	38.4%	£808,005	2.22	£231,707	-£576,299
50	10%	415	56.6%	223	35.0%	£638,022	2.31	£201,356	-£436,667
55	10%	336	45.9%	154	31.4%	£490,447	2.43	£171,644	-£318,803
60	10%	259	35.4%	102	28.2%	£361,358	2.59	£141,330	-£220,028
65	10%	194	26.4%	64	24.9%	£258,353	2.79	£113,692	-£144,661
70	10%	139	18.9%	39	22.0%	£177,686	3.06	£89,076	-£88,610
75	10%	96	13.2%	23	18.9%	£119,006	3.40	£68,937	-£50,068
80	10%	64	8.8%	12	16.3%	£76,746	3.85	£51,997	-£24,749
85	10%	41	5.6%	6	12.7%	£46,741	4.46	£38,182	-£8,559
90	10%	24	3.2%	2	9.5%	£26,189	5.20	£25,896	-£293
95	10%	12	1.6%	1	4.5%	£12,359	6.53	£16,168	£3,809
0	15%	734	100.0%	766	51.1%	£1,499,666	2.00	£462,634	-£1,037,032
5	15%	734	100.0%	766	51.1%	£1,499,386	2.00	£462,634	-£1,036,752
10	15%	734	100.0%	766	51.1%	£1,499,386	2.00	£462,634	-£1,036,752
15	15%	733	100.0%	765	51.1%	£1,498,546	2.00	£462,557	-£1,035,989
20	15%	733	99.9%	758	50.9%	£1,490,388	2.00	£462,215	-£1,028,173
25	15%	724	98.7%	718	49.8%	£1,442,177	2.01	£458,157	-£984,020
30	15%	695	94.8%	639	47.9%	£1,334,305	2.03	£445,264	-£889,041
35	15%	640	87.2%	519	44.8%	£1,158,545	2.08	£419,600	-£738,945
40	15%	572	78.0%	410	41.7%	£981,665	2.14	£386,128	-£595,537
45	15%	498	67.9%	310	38.4%	£808,005	2.22	£347,560	-£460,445
50	15%	415	56.6%	223	35.0%	£638,022	2.31	£302,034	-£335,989
55	15%	336	45.9%	154	31.4%	£490,447	2.43	£257,466	-£232,981
60	15%	259	35.4%	102	28.2%	£361,358	2.59	£211,995	-£149,363
65	15%	194	26.4%	64	24.9%	£258,353	2.79	£170,538	-£87,815
70	15%	139	18.9%	39	22.0%	£177,686	3.06	£133,613	-£44,072
75	15%	96	13.2%	23	18.9%	£119,006	3.40	£103,406	-£15,600
80	15%	64	8.8%	12	16.3%	£76,746	3.85	£77,995	£1,249
85	15%	41	5.6%	6	12.7%	£46,741	4.46	£57,272	£10,531
90	15%	24	3.2%	2	9.5%	£26,189	5.20	£38,843	£12,654
95	15%	12	1.6%	1	4.5%	£12,359	6.53	£24,252	£11,893
0	20%	734	100.0%	766	51.1%	£1,499,666	2.00	£616,846	-£882,820
5	20%	734	100.0%	766	51.1%	£1,499,386	2.00	£616,846	-£882,540
10	20%	734	100.0%	766	51.1%	£1,499,386	2.00	£616,846	-£882,540
15	20%	733	100.0%	765	51.1%	£1,498,546	2.00	£616,743	-£881,803
20	20%	733	99.9%	758	50.9%	£1,490,388	2.00	£616,287	-£874,101
25	20%	724	98.7%	718	49.8%	£1,442,177	2.01	£610,876	-£831,301
30	20%	695	94.8%	639	47.9%	£1,334,305	2.03	£593,685	-£740,619
35	20%	640	87.2%	519	44.8%	£1,158,545	2.08	£559,467	-£599,078
40	20%	572	78.0%	410	41.7%	£981,665	2.14	£514,837	-£466,827
45	20%	498	67.9%	310	38.4%	£808,005	2.22	£463,414	-£344,592
50	20%	415	56.6%	223	35.0%	£638,022	2.31	£402,711	-£235,311
55	20%	336	45.9%	154	31.4%	£490,447	2.43	£343,289	-£147,159
60	20%	259	35.4%	102	28.2%	£361,358	2.59	£282,660	-£78,698
65	20%	194	26.4%	64	24.9%	£258,353	2.79	£227,384	-£30,969
70	20%	139	18.9%	39	22.0%	£177,686	3.06	£178,151	£466
75	20%	96	13.2%	23	18.9%	£119,006	3.40	£137,874	£18,869
80	20%	64	8.8%	12	16.3%	£76,746	3.85	£103,994	£27,248
85	20%	41	5.6%	6	12.7%	£46,741	4.46	£76,363	£29,622
90	20%	24	3.2%	2	9.5%	£26,189	5.20	£51,791	£25,602
95	20%	12	1.6%	1	4.5%	£12,359	6.53	£32,336	£19,977

**PARR1 “Monthly Archival” Model
Intervention Cost = £500**

Business Case Modelling Using PARR1 Algorithm "Monthly Archival" Model - Intervention Cost = £500 Typical PCT - 1,500 Patients with "Reference" Admissions Per Year									
Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£500/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	695	100.0%	805	53.7%	£749,894	2.04	£298,164	-£451,730
5	10%	695	100.0%	805	53.7%	£749,718	2.04	£298,164	-£451,555
10	10%	695	100.0%	805	53.7%	£749,543	2.04	£298,164	-£451,379
15	10%	694	99.9%	802	53.6%	£747,947	2.04	£298,061	-£449,887
20	10%	691	99.5%	782	53.1%	£736,444	2.05	£297,110	-£439,334
25	10%	675	97.2%	719	51.6%	£696,867	2.06	£292,021	-£404,846
30	10%	637	91.7%	614	49.1%	£625,324	2.10	£280,466	-£344,857
35	10%	577	83.1%	486	45.7%	£531,598	2.15	£260,920	-£270,678
40	10%	509	73.3%	375	42.5%	£442,151	2.22	£236,785	-£205,365
45	10%	435	62.6%	278	39.0%	£356,368	2.31	£210,928	-£145,441
50	10%	357	51.4%	197	35.6%	£277,057	2.41	£180,710	-£96,347
55	10%	285	41.0%	134	31.9%	£209,388	2.55	£152,709	-£56,679
60	10%	217	31.3%	87	28.5%	£151,820	2.74	£124,723	-£27,097
65	10%	160	23.0%	53	25.1%	£106,579	2.96	£99,292	-£7,287
70	10%	114	16.4%	33	22.3%	£73,455	3.26	£78,155	£4,700
75	10%	79	11.3%	19	19.3%	£48,678	3.63	£59,883	£11,205
80	10%	52	7.5%	10	15.8%	£30,950	4.11	£44,962	£14,012
85	10%	34	4.9%	5	12.7%	£19,447	4.69	£33,429	£13,982
90	10%	20	2.9%	2	9.4%	£11,135	5.46	£23,118	£11,983
95	10%	10	1.5%	1	4.9%	£5,383	6.64	£14,288	£8,904
0	15%	695	100.0%	805	53.7%	£749,894	2.04	£447,245	-£302,648
5	15%	695	100.0%	805	53.7%	£749,718	2.04	£447,245	-£302,473
10	15%	695	100.0%	805	53.7%	£749,543	2.04	£447,245	-£302,298
15	15%	694	99.9%	802	53.6%	£747,947	2.04	£447,091	-£300,857
20	15%	691	99.5%	782	53.1%	£736,444	2.05	£445,666	-£290,779
25	15%	675	97.2%	719	51.6%	£696,867	2.06	£438,032	-£258,835
30	15%	637	91.7%	614	49.1%	£625,324	2.10	£420,699	-£204,624
35	15%	577	83.1%	486	45.7%	£531,598	2.15	£391,380	-£140,218
40	15%	509	73.3%	375	42.5%	£442,151	2.22	£355,178	-£86,972
45	15%	435	62.6%	278	39.0%	£356,368	2.31	£316,392	-£39,977
50	15%	357	51.4%	197	35.6%	£277,057	2.41	£271,065	-£5,992
55	15%	285	41.0%	134	31.9%	£209,388	2.55	£229,063	£19,675
60	15%	217	31.3%	87	28.5%	£151,820	2.74	£187,084	£35,264
65	15%	160	23.0%	53	25.1%	£106,579	2.96	£148,938	£42,359
70	15%	114	16.4%	33	22.3%	£73,455	3.26	£117,233	£43,778
75	15%	79	11.3%	19	19.3%	£48,678	3.63	£89,825	£41,147
80	15%	52	7.5%	10	15.8%	£30,950	4.11	£67,443	£36,493
85	15%	34	4.9%	5	12.7%	£19,447	4.69	£50,143	£30,697
90	15%	20	2.9%	2	9.4%	£11,135	5.46	£34,677	£23,542
95	15%	10	1.5%	1	4.9%	£5,383	6.64	£21,432	£16,048
0	20%	695	100.0%	805	53.7%	£749,894	2.04	£596,327	-£153,566
5	20%	695	100.0%	805	53.7%	£749,718	2.04	£596,327	-£153,391
10	20%	695	100.0%	805	53.7%	£749,543	2.04	£596,327	-£153,216
15	20%	694	99.9%	802	53.6%	£747,947	2.04	£596,121	-£151,826
20	20%	691	99.5%	782	53.1%	£736,444	2.05	£594,221	-£142,223
25	20%	675	97.2%	719	51.6%	£696,867	2.06	£584,043	-£112,824
30	20%	637	91.7%	614	49.1%	£625,324	2.10	£560,932	-£64,391
35	20%	577	83.1%	486	45.7%	£531,598	2.15	£521,840	-£9,758
40	20%	509	73.3%	375	42.5%	£442,151	2.22	£473,571	£31,420
45	20%	435	62.6%	278	39.0%	£356,368	2.31	£421,855	£65,487
50	20%	357	51.4%	197	35.6%	£277,057	2.41	£361,420	£84,363
55	20%	285	41.0%	134	31.9%	£209,388	2.55	£305,418	£96,030
60	20%	217	31.3%	87	28.5%	£151,820	2.74	£249,446	£97,626
65	20%	160	23.0%	53	25.1%	£106,579	2.96	£198,584	£92,005
70	20%	114	16.4%	33	22.3%	£73,455	3.26	£156,310	£82,855
75	20%	79	11.3%	19	19.3%	£48,678	3.63	£119,766	£71,088
80	20%	52	7.5%	10	15.8%	£30,950	4.11	£89,924	£58,974
85	20%	34	4.9%	5	12.7%	£19,447	4.69	£66,858	£47,411
90	20%	20	2.9%	2	9.4%	£11,135	5.46	£46,236	£35,101
95	20%	10	1.5%	1	4.9%	£5,383	6.64	£28,575	£23,192

**PARR1 "Monthly Archival" Model
Intervention Cost = £750**

Business Case Modelling Using PARR1 Algorithm
"Monthly Archival" Model - Intervention Cost = £750
Typical PCT - 1,500 Patients with "Reference" Admissions Per Year

Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£750/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	695	100.0%	805	53.7%	£1,124,841	2.04	£298,164	-£826,677
5	10%	695	100.0%	805	53.7%	£1,124,578	2.04	£298,164	-£826,414
10	10%	695	100.0%	805	53.7%	£1,124,315	2.04	£298,164	-£826,151
15	10%	694	99.9%	802	53.6%	£1,121,921	2.04	£298,061	-£823,860
20	10%	691	99.5%	782	53.1%	£1,104,666	2.05	£297,110	-£807,556
25	10%	675	97.2%	719	51.6%	£1,045,301	2.06	£292,021	-£753,279
30	10%	637	91.7%	614	49.1%	£937,985	2.10	£280,466	-£657,519
35	10%	577	83.1%	486	45.7%	£797,397	2.15	£260,920	-£536,477
40	10%	509	73.3%	375	42.5%	£663,226	2.22	£236,785	-£426,440
45	10%	435	62.6%	278	39.0%	£534,552	2.31	£210,928	-£323,625
50	10%	357	51.4%	197	35.6%	£415,585	2.41	£180,710	-£234,875
55	10%	285	41.0%	134	31.9%	£314,082	2.55	£152,709	-£161,373
60	10%	217	31.3%	87	28.5%	£227,730	2.74	£124,723	-£103,007
65	10%	160	23.0%	53	25.1%	£159,869	2.96	£99,292	-£60,576
70	10%	114	16.4%	33	22.3%	£110,183	3.26	£78,155	-£32,027
75	10%	79	11.3%	19	19.3%	£73,017	3.63	£59,883	-£13,134
80	10%	52	7.5%	10	15.8%	£46,425	4.11	£44,962	-£1,462
85	10%	34	4.9%	5	12.7%	£29,170	4.69	£33,429	£4,259
90	10%	20	2.9%	2	9.4%	£16,702	5.46	£23,118	£6,416
95	10%	10	1.5%	1	4.9%	£8,075	6.64	£14,288	£6,213
0	15%	695	100.0%	805	53.7%	£1,124,841	2.04	£447,245	-£677,595
5	15%	695	100.0%	805	53.7%	£1,124,578	2.04	£447,245	-£677,332
10	15%	695	100.0%	805	53.7%	£1,124,315	2.04	£447,245	-£677,069
15	15%	694	99.9%	802	53.6%	£1,121,921	2.04	£447,091	-£674,830
20	15%	691	99.5%	782	53.1%	£1,104,666	2.05	£445,666	-£659,001
25	15%	675	97.2%	719	51.6%	£1,045,301	2.06	£438,032	-£607,269
30	15%	637	91.7%	614	49.1%	£937,985	2.10	£420,699	-£517,286
35	15%	577	83.1%	486	45.7%	£797,397	2.15	£391,380	-£406,017
40	15%	509	73.3%	375	42.5%	£663,226	2.22	£355,178	-£308,048
45	15%	435	62.6%	278	39.0%	£534,552	2.31	£316,392	-£218,161
50	15%	357	51.4%	197	35.6%	£415,585	2.41	£271,065	-£144,520
55	15%	285	41.0%	134	31.9%	£314,082	2.55	£229,063	-£85,019
60	15%	217	31.3%	87	28.5%	£227,730	2.74	£187,084	-£40,646
65	15%	160	23.0%	53	25.1%	£159,869	2.96	£148,938	-£10,930
70	15%	114	16.4%	33	22.3%	£110,183	3.26	£117,233	£7,050
75	15%	79	11.3%	19	19.3%	£73,017	3.63	£89,825	£16,808
80	15%	52	7.5%	10	15.8%	£46,425	4.11	£67,443	£21,019
85	15%	34	4.9%	5	12.7%	£29,170	4.69	£50,143	£20,973
90	15%	20	2.9%	2	9.4%	£16,702	5.46	£34,677	£17,975
95	15%	10	1.5%	1	4.9%	£8,075	6.64	£21,432	£13,357
0	20%	695	100.0%	805	53.7%	£749,894	2.04	£596,327	-£153,566
5	20%	695	100.0%	805	53.7%	£749,718	2.04	£596,327	-£153,391
10	20%	695	100.0%	805	53.7%	£749,543	2.04	£596,327	-£153,216
15	20%	694	99.9%	802	53.6%	£747,947	2.04	£596,121	-£151,826
20	20%	691	99.5%	782	53.1%	£736,444	2.05	£594,221	-£142,223
25	20%	675	97.2%	719	51.6%	£696,867	2.06	£584,043	-£112,824
30	20%	637	91.7%	614	49.1%	£625,324	2.10	£560,932	-£64,391
35	20%	577	83.1%	486	45.7%	£531,598	2.15	£521,840	-£9,758
40	20%	509	73.3%	375	42.5%	£442,151	2.22	£473,571	£31,420
45	20%	435	62.6%	278	39.0%	£356,368	2.31	£421,855	£65,487
50	20%	357	51.4%	197	35.6%	£277,057	2.41	£361,420	£84,363
55	20%	285	41.0%	134	31.9%	£209,388	2.55	£305,418	£96,030
60	20%	217	31.3%	87	28.5%	£151,820	2.74	£249,446	£97,626
65	20%	160	23.0%	53	25.1%	£106,579	2.96	£198,584	£92,005
70	20%	114	16.4%	33	22.3%	£73,455	3.26	£156,310	£82,855
75	20%	79	11.3%	19	19.3%	£48,678	3.63	£119,766	£71,088
80	20%	52	7.5%	10	15.8%	£30,950	4.11	£89,924	£58,974
85	20%	34	4.9%	5	12.7%	£19,447	4.69	£66,858	£47,411
90	20%	20	2.9%	2	9.4%	£11,135	5.46	£46,236	£35,101
95	20%	10	1.5%	1	4.9%	£5,383	6.64	£28,575	£23,192

**PARR1 “Monthly Archival” Model
Intervention Cost = £1,000**

Business Case Modelling Using PARR1 Algorithm
“Monthly Archival” Model - Intervention Cost = £1,000
Typical PCT - 1,500 Patients with “Reference” Admissions Per Year

Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£1,000/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	695	100.0%	805	53.7%	£1,499,788	2.04	£298,164	-£1,201,624
5	10%	695	100.0%	805	53.7%	£1,499,437	2.04	£298,164	-£1,201,273
10	10%	695	100.0%	805	53.7%	£1,499,086	2.04	£298,164	-£1,200,922
15	10%	694	99.9%	802	53.6%	£1,495,895	2.04	£298,061	-£1,197,834
20	10%	691	99.5%	782	53.1%	£1,472,889	2.05	£297,110	-£1,175,778
25	10%	675	97.2%	719	51.6%	£1,393,735	2.06	£292,021	-£1,101,713
30	10%	637	91.7%	614	49.1%	£1,250,647	2.10	£280,466	-£970,181
35	10%	577	83.1%	486	45.7%	£1,063,196	2.15	£260,920	-£802,276
40	10%	509	73.3%	375	42.5%	£884,301	2.22	£236,785	-£647,516
45	10%	435	62.6%	278	39.0%	£712,737	2.31	£210,928	-£501,809
50	10%	357	51.4%	197	35.6%	£554,113	2.41	£180,710	-£373,403
55	10%	285	41.0%	134	31.9%	£418,776	2.55	£152,709	-£266,067
60	10%	217	31.3%	87	28.5%	£303,640	2.74	£124,723	-£178,917
65	10%	160	23.0%	53	25.1%	£213,158	2.96	£99,292	-£113,866
70	10%	114	16.4%	33	22.3%	£146,910	3.26	£78,155	-£68,755
75	10%	79	11.3%	19	19.3%	£97,356	3.63	£59,883	-£37,472
80	10%	52	7.5%	10	15.8%	£61,899	4.11	£44,962	-£16,937
85	10%	34	4.9%	5	12.7%	£38,893	4.69	£33,429	-£5,464
90	10%	20	2.9%	2	9.4%	£22,270	5.46	£23,118	£848
95	10%	10	1.5%	1	4.9%	£10,767	6.64	£14,288	£3,521
0	15%	695	100.0%	805	53.7%	£1,499,788	2.04	£447,245	-£1,052,542
5	15%	695	100.0%	805	53.7%	£1,499,437	2.04	£447,245	-£1,052,191
10	15%	695	100.0%	805	53.7%	£1,499,086	2.04	£447,245	-£1,051,841
15	15%	694	99.9%	802	53.6%	£1,495,895	2.04	£447,091	-£1,048,804
20	15%	691	99.5%	782	53.1%	£1,472,889	2.05	£445,666	-£1,027,223
25	15%	675	97.2%	719	51.6%	£1,393,735	2.06	£438,032	-£955,702
30	15%	637	91.7%	614	49.1%	£1,250,647	2.10	£420,699	-£829,948
35	15%	577	83.1%	486	45.7%	£1,063,196	2.15	£391,380	-£671,816
40	15%	509	73.3%	375	42.5%	£884,301	2.22	£355,178	-£529,123
45	15%	435	62.6%	278	39.0%	£712,737	2.31	£316,392	-£396,345
50	15%	357	51.4%	197	35.6%	£554,113	2.41	£271,065	-£283,048
55	15%	285	41.0%	134	31.9%	£418,776	2.55	£229,063	-£189,713
60	15%	217	31.3%	87	28.5%	£303,640	2.74	£187,084	-£116,556
65	15%	160	23.0%	53	25.1%	£213,158	2.96	£148,938	-£64,220
70	15%	114	16.4%	33	22.3%	£146,910	3.26	£117,233	-£29,677
75	15%	79	11.3%	19	19.3%	£97,356	3.63	£89,825	-£7,531
80	15%	52	7.5%	10	15.8%	£61,899	4.11	£67,443	£5,544
85	15%	34	4.9%	5	12.7%	£38,893	4.69	£50,143	£11,250
90	15%	20	2.9%	2	9.4%	£22,270	5.46	£34,677	£12,407
95	15%	10	1.5%	1	4.9%	£10,767	6.64	£21,432	£10,665
0	20%	695	100.0%	805	53.7%	£1,499,788	2.04	£596,327	-£903,460
5	20%	695	100.0%	805	53.7%	£1,499,437	2.04	£596,327	-£903,110
10	20%	695	100.0%	805	53.7%	£1,499,086	2.04	£596,327	-£902,759
15	20%	694	99.9%	802	53.6%	£1,495,895	2.04	£596,121	-£899,774
20	20%	691	99.5%	782	53.1%	£1,472,889	2.05	£594,221	-£878,668
25	20%	675	97.2%	719	51.6%	£1,393,735	2.06	£584,043	-£809,692
30	20%	637	91.7%	614	49.1%	£1,250,647	2.10	£560,932	-£689,715
35	20%	577	83.1%	486	45.7%	£1,063,196	2.15	£521,840	-£541,356
40	20%	509	73.3%	375	42.5%	£884,301	2.22	£473,571	-£410,730
45	20%	435	62.6%	278	39.0%	£712,737	2.31	£421,855	-£290,881
50	20%	357	51.4%	197	35.6%	£554,113	2.41	£361,420	-£192,693
55	20%	285	41.0%	134	31.9%	£418,776	2.55	£305,418	-£113,358
60	20%	217	31.3%	87	28.5%	£303,640	2.74	£249,446	-£54,194
65	20%	160	23.0%	53	25.1%	£213,158	2.96	£198,584	-£14,574
70	20%	114	16.4%	33	22.3%	£146,910	3.26	£156,310	£9,400
75	20%	79	11.3%	19	19.3%	£97,356	3.63	£119,766	£22,411
80	20%	52	7.5%	10	15.8%	£61,899	4.11	£89,924	£28,025
85	20%	34	4.9%	5	12.7%	£38,893	4.69	£66,858	£27,964
90	20%	20	2.9%	2	9.4%	£22,270	5.46	£46,236	£23,966
95	20%	10	1.5%	1	4.9%	£10,767	6.64	£28,575	£17,809

**PARR1 “Annual Archival” Model
Intervention Cost = £500**

Business Case Modelling Using PARR1 Algorithm
“Annual Archival” Model - Intervention Cost = £500
Typical PCT - 1,500 Patients with “Reference” Admissions Per Year

Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£500/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	597	100.0%	902	60.2%	£749,708	2.01	£252,044	£-497,664
5	10%	597	100.0%	902	60.2%	£749,708	2.01	£252,044	£-497,664
10	10%	597	100.0%	901	60.2%	£749,156	2.01	£252,004	£-497,151
15	10%	593	99.3%	874	59.6%	£733,399	2.02	£250,956	£-482,443
20	10%	574	96.2%	786	57.8%	£680,127	2.04	£245,331	£-434,797
25	10%	535	89.5%	650	54.9%	£592,313	2.08	£232,967	£-359,346
30	10%	482	80.7%	510	51.4%	£495,696	2.14	£216,019	£-279,678
35	10%	419	70.2%	385	47.9%	£401,823	2.21	£194,741	£-207,082
40	10%	355	59.5%	281	44.2%	£318,162	2.32	£172,807	£-145,356
45	10%	287	48.0%	197	40.7%	£241,646	2.46	£147,992	£-93,654
50	10%	224	37.5%	132	37.1%	£177,801	2.63	£123,457	£-54,343
55	10%	168	28.2%	87	34.2%	£127,692	2.86	£100,939	£-26,752
60	10%	127	21.2%	54	29.8%	£90,043	3.11	£82,550	£-7,493
65	10%	93	15.5%	33	26.0%	£62,646	3.44	£66,946	£4,301
70	10%	66	11.0%	19	22.8%	£42,659	3.85	£53,206	£10,547
75	10%	47	7.8%	11	18.9%	£28,693	4.35	£42,500	£13,806
80	10%	31	5.2%	6	16.6%	£18,767	4.95	£32,553	£13,786
85	10%	21	3.6%	4	14.2%	£12,441	5.85	£26,223	£13,782
90	10%	13	2.2%	2	11.5%	£7,450	6.93	£19,197	£11,748
95	10%	7	1.2%	1	7.1%	£3,753	8.75	£12,819	£9,066
0	15%	597	100.0%	902	60.2%	£749,708	2.01	£378,067	£-371,642
5	15%	597	100.0%	902	60.2%	£749,708	2.01	£378,067	£-371,642
10	15%	597	100.0%	901	60.2%	£749,156	2.01	£378,007	£-371,149
15	15%	593	99.3%	874	59.6%	£733,399	2.02	£376,434	£-356,965
20	15%	574	96.2%	786	57.8%	£680,127	2.04	£367,996	£-312,132
25	15%	535	89.5%	650	54.9%	£592,313	2.08	£349,451	£-242,862
30	15%	482	80.7%	510	51.4%	£495,696	2.14	£324,028	£-171,668
35	15%	419	70.2%	385	47.9%	£401,823	2.21	£292,111	£-109,712
40	15%	355	59.5%	281	44.2%	£318,162	2.32	£259,210	£-58,952
45	15%	287	48.0%	197	40.7%	£241,646	2.46	£221,988	£-19,658
50	15%	224	37.5%	132	37.1%	£177,801	2.63	£185,186	£7,386
55	15%	168	28.2%	87	34.2%	£127,692	2.86	£151,409	£23,717
60	15%	127	21.2%	54	29.8%	£90,043	3.11	£123,826	£33,782
65	15%	93	15.5%	33	26.0%	£62,646	3.44	£100,419	£37,774
70	15%	66	11.0%	19	22.8%	£42,659	3.85	£79,810	£37,150
75	15%	47	7.8%	11	18.9%	£28,693	4.35	£63,749	£35,056
80	15%	31	5.2%	6	16.6%	£18,767	4.95	£48,829	£30,062
85	15%	21	3.6%	4	14.2%	£12,441	5.85	£39,335	£26,893
90	15%	13	2.2%	2	11.5%	£7,450	6.93	£28,796	£21,346
95	15%	7	1.2%	1	7.1%	£3,753	8.75	£19,229	£15,476
0	20%	597	100.0%	902	60.2%	£749,708	2.01	£504,089	£-245,619
5	20%	597	100.0%	902	60.2%	£749,708	2.01	£504,089	£-245,619
10	20%	597	100.0%	901	60.2%	£749,156	2.01	£504,009	£-245,147
15	20%	593	99.3%	874	59.6%	£733,399	2.02	£501,912	£-231,487
20	20%	574	96.2%	786	57.8%	£680,127	2.04	£490,661	£-189,466
25	20%	535	89.5%	650	54.9%	£592,313	2.08	£465,934	£-126,379
30	20%	482	80.7%	510	51.4%	£495,696	2.14	£432,037	£-63,659
35	20%	419	70.2%	385	47.9%	£401,823	2.21	£389,482	£-12,342
40	20%	355	59.5%	281	44.2%	£318,162	2.32	£345,614	£27,451
45	20%	287	48.0%	197	40.7%	£241,646	2.46	£295,984	£54,338
50	20%	224	37.5%	132	37.1%	£177,801	2.63	£246,915	£69,114
55	20%	168	28.2%	87	34.2%	£127,692	2.86	£201,879	£74,187
60	20%	127	21.2%	54	29.8%	£90,043	3.11	£165,101	£75,057
65	20%	93	15.5%	33	26.0%	£62,646	3.44	£133,892	£71,247
70	20%	66	11.0%	19	22.8%	£42,659	3.85	£106,413	£63,754
75	20%	47	7.8%	11	18.9%	£28,693	4.35	£84,999	£56,306
80	20%	31	5.2%	6	16.6%	£18,767	4.95	£65,106	£46,339
85	20%	21	3.6%	4	14.2%	£12,441	5.85	£52,446	£40,005
90	20%	13	2.2%	2	11.5%	£7,450	6.93	£38,394	£30,945
95	20%	7	1.2%	1	7.1%	£3,753	8.75	£25,639	£21,886

**PARR1 "Annual Archival" Model
Intervention Cost = £750**

Business Case Modelling Using PARR1 Algorithm "Annual Archival" Model - Intervention Cost = £750 Typical PCT - 1,500 Patients with "Reference" Admissions Per Year									
Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£750/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	597	100.0%	902	60.2%	£1,124,562	2.01	£252,044	-£872,518
5	10%	597	100.0%	902	60.2%	£1,124,562	2.01	£252,044	-£872,518
10	10%	597	100.0%	901	60.2%	£1,123,733	2.01	£252,004	-£871,729
15	10%	593	99.3%	874	59.6%	£1,100,098	2.02	£250,956	-£849,142
20	10%	574	96.2%	786	57.8%	£1,020,191	2.04	£245,331	-£774,860
25	10%	535	89.5%	650	54.9%	£888,470	2.08	£232,967	-£655,502
30	10%	482	80.7%	510	51.4%	£743,545	2.14	£216,019	-£527,526
35	10%	419	70.2%	385	47.9%	£602,735	2.21	£194,741	-£407,994
40	10%	355	59.5%	281	44.2%	£477,244	2.32	£172,807	-£304,437
45	10%	287	48.0%	197	40.7%	£362,470	2.46	£147,992	-£214,478
50	10%	224	37.5%	132	37.1%	£266,701	2.63	£123,457	-£143,243
55	10%	168	28.2%	87	34.2%	£191,538	2.86	£100,939	-£90,598
60	10%	127	21.2%	54	29.8%	£135,065	3.11	£82,550	-£52,515
65	10%	93	15.5%	33	26.0%	£93,968	3.44	£66,946	-£27,022
70	10%	66	11.0%	19	22.8%	£63,989	3.85	£53,206	-£10,782
75	10%	47	7.8%	11	18.9%	£43,040	4.35	£42,500	-£541
80	10%	31	5.2%	6	16.6%	£28,150	4.95	£32,553	£4,402
85	10%	21	3.6%	4	14.2%	£18,662	5.85	£26,223	£7,561
90	10%	13	2.2%	2	11.5%	£11,174	6.93	£19,197	£8,023
95	10%	7	1.2%	1	7.1%	£5,630	8.75	£12,819	£7,189
0	15%	597	100.0%	902	60.2%	£1,124,562	2.01	£378,067	-£746,496
5	15%	597	100.0%	902	60.2%	£1,124,562	2.01	£378,067	-£746,496
10	15%	597	100.0%	901	60.2%	£1,123,733	2.01	£378,007	-£745,727
15	15%	593	99.3%	874	59.6%	£1,100,098	2.02	£376,434	-£723,664
20	15%	574	96.2%	786	57.8%	£1,020,191	2.04	£367,996	-£652,195
25	15%	535	89.5%	650	54.9%	£888,470	2.08	£349,451	-£539,019
30	15%	482	80.7%	510	51.4%	£743,545	2.14	£324,028	-£419,517
35	15%	419	70.2%	385	47.9%	£602,735	2.21	£292,111	-£310,624
40	15%	355	59.5%	281	44.2%	£477,244	2.32	£259,210	-£218,033
45	15%	287	48.0%	197	40.7%	£362,470	2.46	£221,988	-£140,482
50	15%	224	37.5%	132	37.1%	£266,701	2.63	£185,186	-£81,515
55	15%	168	28.2%	87	34.2%	£191,538	2.86	£151,409	-£40,129
60	15%	127	21.2%	54	29.8%	£135,065	3.11	£123,826	-£11,240
65	15%	93	15.5%	33	26.0%	£93,968	3.44	£100,419	£6,451
70	15%	66	11.0%	19	22.8%	£63,989	3.85	£79,810	£15,821
75	15%	47	7.8%	11	18.9%	£43,040	4.35	£63,749	£20,709
80	15%	31	5.2%	6	16.6%	£28,150	4.95	£48,829	£20,679
85	15%	21	3.6%	4	14.2%	£18,662	5.85	£39,335	£20,672
90	15%	13	2.2%	2	11.5%	£11,174	6.93	£28,796	£17,621
95	15%	7	1.2%	1	7.1%	£5,630	8.75	£19,229	£13,599
0	20%	597	100.0%	902	60.2%	£1,124,562	2.01	£504,089	-£620,473
5	20%	597	100.0%	902	60.2%	£1,124,562	2.01	£504,089	-£620,473
10	20%	597	100.0%	901	60.2%	£1,123,733	2.01	£504,009	-£619,725
15	20%	593	99.3%	874	59.6%	£1,100,098	2.02	£501,912	-£598,186
20	20%	574	96.2%	786	57.8%	£1,020,191	2.04	£490,661	-£529,530
25	20%	535	89.5%	650	54.9%	£888,470	2.08	£465,934	-£422,535
30	20%	482	80.7%	510	51.4%	£743,545	2.14	£432,037	-£311,507
35	20%	419	70.2%	385	47.9%	£602,735	2.21	£389,482	-£213,253
40	20%	355	59.5%	281	44.2%	£477,244	2.32	£345,614	-£131,630
45	20%	287	48.0%	197	40.7%	£362,470	2.46	£295,984	-£66,485
50	20%	224	37.5%	132	37.1%	£266,701	2.63	£246,915	-£19,786
55	20%	168	28.2%	87	34.2%	£191,538	2.86	£201,879	£10,341
60	20%	127	21.2%	54	29.8%	£135,065	3.11	£165,101	£30,036
65	20%	93	15.5%	33	26.0%	£93,968	3.44	£133,892	£39,924
70	20%	66	11.0%	19	22.8%	£63,989	3.85	£106,413	£42,424
75	20%	47	7.8%	11	18.9%	£43,040	4.35	£84,999	£41,959
80	20%	31	5.2%	6	16.6%	£28,150	4.95	£65,106	£36,955
85	20%	21	3.6%	4	14.2%	£18,662	5.85	£52,446	£33,784
90	20%	13	2.2%	2	11.5%	£11,174	6.93	£38,394	£27,220
95	20%	7	1.2%	1	7.1%	£5,630	8.75	£25,639	£20,009

**PARR1 “Annual Archival” Model
Intervention Cost = £1,000**

Business Case Modelling Using PARR1 Algorithm "Annual Archival" Model - Intervention Cost = £1,000 Typical PCT - 1,500 Patients with "Reference" Admissions Per Year									
Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£1,000/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	597	100.0%	902	60.2%	£1,499,416	2.01	£252,044	£-1,247,372
5	10%	597	100.0%	902	60.2%	£1,499,416	2.01	£252,044	£-1,247,372
10	10%	597	100.0%	901	60.2%	£1,498,311	2.01	£252,004	£-1,246,307
15	10%	593	99.3%	874	59.6%	£1,466,798	2.02	£250,956	£-1,215,842
20	10%	574	96.2%	786	57.8%	£1,360,255	2.04	£245,331	£-1,114,924
25	10%	535	89.5%	650	54.9%	£1,184,626	2.08	£232,967	£-951,659
30	10%	482	80.7%	510	51.4%	£991,393	2.14	£216,019	£-775,374
35	10%	419	70.2%	385	47.9%	£803,647	2.21	£194,741	£-608,906
40	10%	355	59.5%	281	44.2%	£636,325	2.32	£172,807	£-463,518
45	10%	287	48.0%	197	40.7%	£483,293	2.46	£147,992	£-335,301
50	10%	224	37.5%	132	37.1%	£355,601	2.63	£123,457	£-232,144
55	10%	168	28.2%	87	34.2%	£255,384	2.86	£100,939	£-154,444
60	10%	127	21.2%	54	29.8%	£180,087	3.11	£82,550	£-97,537
65	10%	93	15.5%	33	26.0%	£125,291	3.44	£66,946	£-58,345
70	10%	66	11.0%	19	22.8%	£85,318	3.85	£53,206	£-32,112
75	10%	47	7.8%	11	18.9%	£57,387	4.35	£42,500	£-14,887
80	10%	31	5.2%	6	16.6%	£37,534	4.95	£32,553	£-4,981
85	10%	21	3.6%	4	14.2%	£24,883	5.85	£26,223	£1,340
90	10%	13	2.2%	2	11.5%	£14,899	6.93	£19,197	£4,298
95	10%	7	1.2%	1	7.1%	£7,507	8.75	£12,819	£5,313
0	15%	597	100.0%	902	60.2%	£1,499,416	2.01	£378,067	£-1,121,350
5	15%	597	100.0%	902	60.2%	£1,499,416	2.01	£378,067	£-1,121,350
10	15%	597	100.0%	901	60.2%	£1,498,311	2.01	£378,007	£-1,120,305
15	15%	593	99.3%	874	59.6%	£1,466,798	2.02	£376,434	£-1,090,364
20	15%	574	96.2%	786	57.8%	£1,360,255	2.04	£367,996	£-992,259
25	15%	535	89.5%	650	54.9%	£1,184,626	2.08	£349,451	£-835,175
30	15%	482	80.7%	510	51.4%	£991,393	2.14	£324,028	£-667,365
35	15%	419	70.2%	385	47.9%	£803,647	2.21	£292,111	£-511,535
40	15%	355	59.5%	281	44.2%	£636,325	2.32	£259,210	£-377,115
45	15%	287	48.0%	197	40.7%	£483,293	2.46	£221,988	£-261,305
50	15%	224	37.5%	132	37.1%	£355,601	2.63	£185,186	£-170,415
55	15%	168	28.2%	87	34.2%	£255,384	2.86	£151,409	£-103,974
60	15%	127	21.2%	54	29.8%	£180,087	3.11	£123,826	£-56,261
65	15%	93	15.5%	33	26.0%	£125,291	3.44	£100,419	£-24,872
70	15%	66	11.0%	19	22.8%	£85,318	3.85	£79,810	£-5,509
75	15%	47	7.8%	11	18.9%	£57,387	4.35	£63,749	£6,362
80	15%	31	5.2%	6	16.6%	£37,534	4.95	£48,829	£11,295
85	15%	21	3.6%	4	14.2%	£24,883	5.85	£39,335	£14,452
90	15%	13	2.2%	2	11.5%	£14,899	6.93	£28,796	£13,897
95	15%	7	1.2%	1	7.1%	£7,507	8.75	£19,229	£11,722
0	20%	597	100.0%	902	60.2%	£1,499,416	2.01	£504,089	£-995,327
5	20%	597	100.0%	902	60.2%	£1,499,416	2.01	£504,089	£-995,327
10	20%	597	100.0%	901	60.2%	£1,498,311	2.01	£504,009	£-994,302
15	20%	593	99.3%	874	59.6%	£1,466,798	2.02	£501,912	£-964,886
20	20%	574	96.2%	786	57.8%	£1,360,255	2.04	£490,661	£-869,594
25	20%	535	89.5%	650	54.9%	£1,184,626	2.08	£465,934	£-718,692
30	20%	482	80.7%	510	51.4%	£991,393	2.14	£432,037	£-559,356
35	20%	419	70.2%	385	47.9%	£803,647	2.21	£389,482	£-414,165
40	20%	355	59.5%	281	44.2%	£636,325	2.32	£345,614	£-290,711
45	20%	287	48.0%	197	40.7%	£483,293	2.46	£295,984	£-187,309
50	20%	224	37.5%	132	37.1%	£355,601	2.63	£246,915	£-108,686
55	20%	168	28.2%	87	34.2%	£255,384	2.86	£201,879	£-53,505
60	20%	127	21.2%	54	29.8%	£180,087	3.11	£165,101	£-14,986
65	20%	93	15.5%	33	26.0%	£125,291	3.44	£133,892	£8,601
70	20%	66	11.0%	19	22.8%	£85,318	3.85	£106,413	£21,094
75	20%	47	7.8%	11	18.9%	£57,387	4.35	£84,999	£27,612
80	20%	31	5.2%	6	16.6%	£37,534	4.95	£65,106	£27,572
85	20%	21	3.6%	4	14.2%	£24,883	5.85	£52,446	£27,563
90	20%	13	2.2%	2	11.5%	£14,899	6.93	£38,394	£23,495
95	20%	7	1.2%	1	7.1%	£7,507	8.75	£25,639	£18,132

PARR2 “Real Time” Model Intervention Cost = £500

Business Case Modelling Using PARR2 Algorithm
“Real Time” Model - Intervention Cost = £500
Typical PCT - 9,000 Patients with Emergency Admissions

Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£500/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	2,675	100.0%	6325	70.3%	£4,499,969	1.74	£977,508	£-3,522,461
5	10%	2,675	100.0%	6325	70.3%	£4,499,969	1.74	£977,508	£-3,522,461
10	10%	2,640	98.7%	5905	69.1%	£4,272,791	1.75	£969,104	£-3,303,688
15	10%	2,522	94.3%	4952	66.3%	£3,736,910	1.77	£937,385	£-2,799,525
20	10%	2,262	84.5%	3612	61.5%	£2,936,746	1.81	£861,240	£-2,075,506
25	10%	1,977	73.9%	2636	57.1%	£2,306,500	1.87	£774,936	£-1,531,563
30	10%	1,654	61.8%	1839	52.6%	£1,746,140	1.93	£669,962	£-1,076,178
35	10%	1,368	51.2%	1280	48.3%	£1,324,017	2.00	£574,704	£-749,314
40	10%	1,117	41.8%	901	44.7%	£1,009,210	2.08	£487,782	£-521,428
45	10%	901	33.7%	637	41.4%	£768,839	2.16	£409,018	£-359,820
50	10%	709	26.5%	442	38.4%	£575,787	2.26	£337,259	£-238,528
55	10%	548	20.5%	301	35.4%	£424,179	2.38	£273,950	£-150,229
60	10%	410	15.3%	198	32.5%	£303,929	2.53	£218,244	£-85,685
65	10%	298	11.1%	124	29.4%	£210,713	2.72	£170,254	£-40,459
70	10%	214	8.0%	74	25.8%	£144,129	2.96	£132,885	£-11,243
75	10%	150	5.6%	44	22.7%	£96,809	3.25	£102,071	£5,262
80	10%	100	3.7%	24	19.7%	£62,019	3.65	£76,465	£14,446
85	10%	63	2.4%	12	15.8%	£37,623	4.16	£55,401	£17,778
90	10%	39	1.4%	5	11.9%	£21,952	4.91	£39,905	£17,953
95	10%	18	0.7%	2	8.2%	£10,053	6.24	£24,185	£14,132
0	15%	2,675	100.0%	6325	70.3%	£4,499,969	1.74	£1,466,262	£-3,033,707
5	15%	2,675	100.0%	6325	70.3%	£4,499,969	1.74	£1,466,262	£-3,033,707
10	15%	2,640	98.7%	5905	69.1%	£4,272,791	1.75	£1,453,656	£-2,819,136
15	15%	2,522	94.3%	4952	66.3%	£3,736,910	1.77	£1,406,078	£-2,330,832
20	15%	2,262	84.5%	3612	61.5%	£2,936,746	1.81	£1,291,860	£-1,644,886
25	15%	1,977	73.9%	2636	57.1%	£2,306,500	1.87	£1,162,404	£-1,144,095
30	15%	1,654	61.8%	1839	52.6%	£1,746,140	1.93	£1,004,943	£-741,197
35	15%	1,368	51.2%	1280	48.3%	£1,324,017	2.00	£862,056	£-461,962
40	15%	1,117	41.8%	901	44.7%	£1,009,210	2.08	£731,672	£-277,538
45	15%	901	33.7%	637	41.4%	£768,839	2.16	£613,528	£-155,311
50	15%	709	26.5%	442	38.4%	£575,787	2.26	£505,888	£-69,899
55	15%	548	20.5%	301	35.4%	£424,179	2.38	£410,926	£-13,253
60	15%	410	15.3%	198	32.5%	£303,929	2.53	£327,366	£23,437
65	15%	298	11.1%	124	29.4%	£210,713	2.72	£255,382	£44,668
70	15%	214	8.0%	74	25.8%	£144,129	2.96	£199,328	£55,199
75	15%	150	5.6%	44	22.7%	£96,809	3.25	£153,107	£56,298
80	15%	100	3.7%	24	19.7%	£62,019	3.65	£114,697	£52,678
85	15%	63	2.4%	12	15.8%	£37,623	4.16	£83,101	£45,478
90	15%	39	1.4%	5	11.9%	£21,952	4.91	£59,858	£37,906
95	15%	18	0.7%	2	8.2%	£10,053	6.24	£36,278	£26,224
0	20%	2,675	100.0%	6325	70.3%	£4,499,969	1.74	£1,955,015	£-2,544,953
5	20%	2,675	100.0%	6325	70.3%	£4,499,969	1.74	£1,955,015	£-2,544,953
10	20%	2,640	98.7%	5905	69.1%	£4,272,791	1.75	£1,938,208	£-2,334,584
15	20%	2,522	94.3%	4952	66.3%	£3,736,910	1.77	£1,874,770	£-1,862,140
20	20%	2,262	84.5%	3612	61.5%	£2,936,746	1.81	£1,722,479	£-1,214,266
25	20%	1,977	73.9%	2636	57.1%	£2,306,500	1.87	£1,549,873	£-756,627
30	20%	1,654	61.8%	1839	52.6%	£1,746,140	1.93	£1,339,924	£-406,217
35	20%	1,368	51.2%	1280	48.3%	£1,324,017	2.00	£1,149,408	£-174,610
40	20%	1,117	41.8%	901	44.7%	£1,009,210	2.08	£975,563	£-33,647
45	20%	901	33.7%	637	41.4%	£768,839	2.16	£818,037	£49,198
50	20%	709	26.5%	442	38.4%	£575,787	2.26	£674,517	£98,730
55	20%	548	20.5%	301	35.4%	£424,179	2.38	£547,901	£123,722
60	20%	410	15.3%	198	32.5%	£303,929	2.53	£436,488	£132,559
65	20%	298	11.1%	124	29.4%	£210,713	2.72	£340,509	£129,795
70	20%	214	8.0%	74	25.8%	£144,129	2.96	£265,771	£121,642
75	20%	150	5.6%	44	22.7%	£96,809	3.25	£204,142	£107,333
80	20%	100	3.7%	24	19.7%	£62,019	3.65	£152,930	£90,910
85	20%	63	2.4%	12	15.8%	£37,623	4.16	£110,801	£73,179
90	20%	39	1.4%	5	11.9%	£21,952	4.91	£79,810	£57,858
95	20%	18	0.7%	2	8.2%	£10,053	6.24	£48,370	£38,317

**PARR2 “Real Time” Model
Intervention Cost = £750**

Business Case Modelling Using PARR2 Algorithm
“Real Time” Model - Intervention Cost = £750
Typical PCT - 9,000 Patients with Emergency Admissions

Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£750/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	2,675	100.0%	6325	70.3%	£6,749,953	1.74	£977,508	£-5,772,446
5	10%	2,675	100.0%	6325	70.3%	£6,749,953	1.74	£977,508	£-5,772,446
10	10%	2,640	98.7%	5905	69.1%	£6,409,187	1.75	£969,104	£-5,440,083
15	10%	2,522	94.3%	4952	66.3%	£5,605,365	1.77	£937,385	£-4,667,980
20	10%	2,262	84.5%	3612	61.5%	£4,405,119	1.81	£861,240	£-3,543,879
25	10%	1,977	73.9%	2636	57.1%	£3,459,749	1.87	£774,936	£-2,684,813
30	10%	1,654	61.8%	1839	52.6%	£2,619,211	1.93	£669,962	£-1,949,249
35	10%	1,368	51.2%	1280	48.3%	£1,986,026	2.00	£574,704	£-1,411,322
40	10%	1,117	41.8%	901	44.7%	£1,513,815	2.08	£487,782	£-1,026,033
45	10%	901	33.7%	637	41.4%	£1,153,258	2.16	£409,018	£-744,239
50	10%	709	26.5%	442	38.4%	£863,681	2.26	£337,259	£-526,422
55	10%	548	20.5%	301	35.4%	£636,268	2.38	£273,950	£-362,318
60	10%	410	15.3%	198	32.5%	£455,893	2.53	£218,244	£-237,649
65	10%	298	11.1%	124	29.4%	£316,070	2.72	£170,254	£-145,816
70	10%	214	8.0%	74	25.8%	£216,193	2.96	£132,885	£-83,308
75	10%	150	5.6%	44	22.7%	£145,214	3.25	£102,071	£-43,143
80	10%	100	3.7%	24	19.7%	£93,029	3.65	£76,465	£-16,564
85	10%	63	2.4%	12	15.8%	£56,434	4.16	£55,401	£-1,033
90	10%	39	1.4%	5	11.9%	£32,928	4.91	£39,905	£6,977
95	10%	18	0.7%	2	8.2%	£15,080	6.24	£24,185	£9,105
0	15%	2,675	100.0%	6325	70.3%	£6,749,953	1.74	£1,466,262	£-5,283,692
5	15%	2,675	100.0%	6325	70.3%	£6,749,953	1.74	£1,466,262	£-5,283,692
10	15%	2,640	98.7%	5905	69.1%	£6,409,187	1.75	£1,453,656	£-4,955,531
15	15%	2,522	94.3%	4952	66.3%	£5,605,365	1.77	£1,406,078	£-4,199,287
20	15%	2,262	84.5%	3612	61.5%	£4,405,119	1.81	£1,291,860	£-3,113,259
25	15%	1,977	73.9%	2636	57.1%	£3,459,749	1.87	£1,162,404	£-2,297,345
30	15%	1,654	61.8%	1839	52.6%	£2,619,211	1.93	£1,004,943	£-1,614,268
35	15%	1,368	51.2%	1280	48.3%	£1,986,026	2.00	£862,056	£-1,123,970
40	15%	1,117	41.8%	901	44.7%	£1,513,815	2.08	£731,672	£-782,143
45	15%	901	33.7%	637	41.4%	£1,153,258	2.16	£613,528	£-539,730
50	15%	709	26.5%	442	38.4%	£863,681	2.26	£505,888	£-357,793
55	15%	548	20.5%	301	35.4%	£636,268	2.38	£410,926	£-225,343
60	15%	410	15.3%	198	32.5%	£455,893	2.53	£327,366	£-128,527
65	15%	298	11.1%	124	29.4%	£316,070	2.72	£255,382	£-60,689
70	15%	214	8.0%	74	25.8%	£216,193	2.96	£199,328	£-16,865
75	15%	150	5.6%	44	22.7%	£145,214	3.25	£153,107	£7,893
80	15%	100	3.7%	24	19.7%	£93,029	3.65	£114,697	£21,668
85	15%	63	2.4%	12	15.8%	£56,434	4.16	£83,101	£26,667
90	15%	39	1.4%	5	11.9%	£32,928	4.91	£59,858	£26,930
95	15%	18	0.7%	2	8.2%	£15,080	6.24	£36,278	£21,198
0	20%	2,675	100.0%	6325	70.3%	£6,749,953	1.74	£1,955,015	£-4,794,938
5	20%	2,675	100.0%	6325	70.3%	£6,749,953	1.74	£1,955,015	£-4,794,938
10	20%	2,640	98.7%	5905	69.1%	£6,409,187	1.75	£1,938,208	£-4,470,980
15	20%	2,522	94.3%	4952	66.3%	£5,605,365	1.77	£1,874,770	£-3,730,594
20	20%	2,262	84.5%	3612	61.5%	£4,405,119	1.81	£1,722,479	£-2,682,639
25	20%	1,977	73.9%	2636	57.1%	£3,459,749	1.87	£1,549,873	£-1,909,877
30	20%	1,654	61.8%	1839	52.6%	£2,619,211	1.93	£1,339,924	£-1,279,287
35	20%	1,368	51.2%	1280	48.3%	£1,986,026	2.00	£1,149,408	£-836,619
40	20%	1,117	41.8%	901	44.7%	£1,513,815	2.08	£975,563	£-538,252
45	20%	901	33.7%	637	41.4%	£1,153,258	2.16	£818,037	£-335,221
50	20%	709	26.5%	442	38.4%	£863,681	2.26	£674,517	£-189,163
55	20%	548	20.5%	301	35.4%	£636,268	2.38	£547,901	£-88,368
60	20%	410	15.3%	198	32.5%	£455,893	2.53	£436,488	£-19,405
65	20%	298	11.1%	124	29.4%	£316,070	2.72	£340,509	£24,439
70	20%	214	8.0%	74	25.8%	£216,193	2.96	£265,771	£49,578
75	20%	150	5.6%	44	22.7%	£145,214	3.25	£204,142	£58,929
80	20%	100	3.7%	24	19.7%	£93,029	3.65	£152,930	£59,901
85	20%	63	2.4%	12	15.8%	£56,434	4.16	£110,801	£54,367
90	20%	39	1.4%	5	11.9%	£32,928	4.91	£79,810	£46,882
95	20%	18	0.7%	2	8.2%	£15,080	6.24	£48,370	£33,290

PARR2 “Real Time” Model Intervention Cost = £1,000

Business Case Modelling Using PARR2 Algorithm
“Real Time” Model - Intervention Cost = £1,000
Typical PCT - 9,000 Patients with Emergency Admissions

Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£1,000/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	2,675	100.0%	6325	70.3%	£8,999,938	1.74	£977,508	£8,022,430
5	10%	2,675	100.0%	6325	70.3%	£8,999,938	1.74	£977,508	£8,022,430
10	10%	2,640	98.7%	5905	69.1%	£8,545,583	1.75	£969,104	£7,576,479
15	10%	2,522	94.3%	4952	66.3%	£7,473,819	1.77	£937,385	£6,536,434
20	10%	2,262	84.5%	3612	61.5%	£5,873,492	1.81	£861,240	£5,012,252
25	10%	1,977	73.9%	2636	57.1%	£4,612,999	1.87	£774,936	£3,838,063
30	10%	1,654	61.8%	1839	52.6%	£3,492,281	1.93	£669,962	£2,822,319
35	10%	1,368	51.2%	1280	48.3%	£2,648,035	2.00	£574,704	£2,073,331
40	10%	1,117	41.8%	901	44.7%	£2,018,420	2.08	£487,782	£1,530,638
45	10%	901	33.7%	637	41.4%	£1,537,677	2.16	£409,018	£1,128,659
50	10%	709	26.5%	442	38.4%	£1,151,574	2.26	£337,259	£814,316
55	10%	548	20.5%	301	35.4%	£848,358	2.38	£273,950	£574,408
60	10%	410	15.3%	198	32.5%	£607,857	2.53	£218,244	£389,613
65	10%	298	11.1%	124	29.4%	£421,427	2.72	£170,254	£251,172
70	10%	214	8.0%	74	25.8%	£288,258	2.96	£132,885	£155,372
75	10%	150	5.6%	44	22.7%	£193,618	3.25	£102,071	£91,547
80	10%	100	3.7%	24	19.7%	£124,039	3.65	£76,465	£47,574
85	10%	63	2.4%	12	15.8%	£75,246	4.16	£55,401	£19,845
90	10%	39	1.4%	5	11.9%	£43,904	4.91	£39,905	£3,999
95	10%	18	0.7%	2	8.2%	£20,106	6.24	£24,185	£4,079
0	15%	2,675	100.0%	6325	70.3%	£8,999,938	1.74	£1,466,262	£7,533,676
5	15%	2,675	100.0%	6325	70.3%	£8,999,938	1.74	£1,466,262	£7,533,676
10	15%	2,640	98.7%	5905	69.1%	£8,545,583	1.75	£1,453,656	£7,091,927
15	15%	2,522	94.3%	4952	66.3%	£7,473,819	1.77	£1,406,078	£6,067,742
20	15%	2,262	84.5%	3612	61.5%	£5,873,492	1.81	£1,291,860	£4,581,632
25	15%	1,977	73.9%	2636	57.1%	£4,612,999	1.87	£1,162,404	£3,450,595
30	15%	1,654	61.8%	1839	52.6%	£3,492,281	1.93	£1,004,943	£2,487,338
35	15%	1,368	51.2%	1280	48.3%	£2,648,035	2.00	£862,056	£1,785,979
40	15%	1,117	41.8%	901	44.7%	£2,018,420	2.08	£731,672	£1,286,747
45	15%	901	33.7%	637	41.4%	£1,537,677	2.16	£613,528	£924,149
50	15%	709	26.5%	442	38.4%	£1,151,574	2.26	£505,888	£645,686
55	15%	548	20.5%	301	35.4%	£848,358	2.38	£410,926	£437,432
60	15%	410	15.3%	198	32.5%	£607,857	2.53	£327,366	£280,491
65	15%	298	11.1%	124	29.4%	£421,427	2.72	£255,382	£166,045
70	15%	214	8.0%	74	25.8%	£288,258	2.96	£199,328	£88,930
75	15%	150	5.6%	44	22.7%	£193,618	3.25	£153,107	£40,512
80	15%	100	3.7%	24	19.7%	£124,039	3.65	£114,697	£9,341
85	15%	63	2.4%	12	15.8%	£75,246	4.16	£83,101	£7,855
90	15%	39	1.4%	5	11.9%	£43,904	4.91	£59,858	£15,954
95	15%	18	0.7%	2	8.2%	£20,106	6.24	£36,278	£16,171
0	20%	2,675	100.0%	6325	70.3%	£8,999,938	1.74	£1,955,015	£7,044,922
5	20%	2,675	100.0%	6325	70.3%	£8,999,938	1.74	£1,955,015	£7,044,922
10	20%	2,640	98.7%	5905	69.1%	£8,545,583	1.75	£1,938,208	£6,607,375
15	20%	2,522	94.3%	4952	66.3%	£7,473,819	1.77	£1,874,770	£5,599,049
20	20%	2,262	84.5%	3612	61.5%	£5,873,492	1.81	£1,722,479	£4,151,012
25	20%	1,977	73.9%	2636	57.1%	£4,612,999	1.87	£1,549,873	£3,063,127
30	20%	1,654	61.8%	1839	52.6%	£3,492,281	1.93	£1,339,924	£2,152,357
35	20%	1,368	51.2%	1280	48.3%	£2,648,035	2.00	£1,149,408	£1,498,627
40	20%	1,117	41.8%	901	44.7%	£2,018,420	2.08	£975,563	£1,042,857
45	20%	901	33.7%	637	41.4%	£1,537,677	2.16	£818,037	£719,640
50	20%	709	26.5%	442	38.4%	£1,151,574	2.26	£674,517	£477,057
55	20%	548	20.5%	301	35.4%	£848,358	2.38	£547,901	£300,457
60	20%	410	15.3%	198	32.5%	£607,857	2.53	£436,488	£171,369
65	20%	298	11.1%	124	29.4%	£421,427	2.72	£340,509	£80,918
70	20%	214	8.0%	74	25.8%	£288,258	2.96	£265,771	£22,487
75	20%	150	5.6%	44	22.7%	£193,618	3.25	£204,142	£10,524
80	20%	100	3.7%	24	19.7%	£124,039	3.65	£152,930	£28,891
85	20%	63	2.4%	12	15.8%	£75,246	4.16	£110,801	£35,556
90	20%	39	1.4%	5	11.9%	£43,904	4.91	£79,810	£35,906
95	20%	18	0.7%	2	8.2%	£20,106	6.24	£48,370	£28,264

**PARR2 “Monthly Archival” Model
Intervention Cost = £500**

Business Case Modelling Using PARR2 Algorithm
“Monthly Archival” Model - Intervention Cost = £500
Typical PCT - 9,000 Patients with Emergency Admissions

Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£500/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	2,432	100.0%	6,568	73.0%	£4,500,007	1.78	£911,726	£-3,588,281
5	10%	2,432	100.0%	6,556	72.9%	£4,493,695	1.79	£911,617	£-3,582,078
10	10%	2,372	97.5%	5,718	70.7%	£4,044,976	1.80	£896,164	£-3,148,812
15	10%	2,192	90.1%	4,274	66.1%	£3,233,067	1.84	£844,819	£-2,388,248
20	10%	1,954	80.3%	3,090	61.3%	£2,522,005	1.89	£773,471	£-1,748,534
25	10%	1,683	69.2%	2,198	56.6%	£1,940,445	1.94	£685,816	£-1,254,629
30	10%	1,418	58.3%	1,563	52.4%	£1,490,770	2.01	£597,628	£-893,142
35	10%	1,179	48.5%	1,114	48.6%	£1,146,462	2.08	£515,647	£-630,815
40	10%	965	39.7%	800	45.3%	£882,520	2.16	£438,888	£-443,632
45	10%	778	32.0%	568	42.2%	£673,279	2.26	£368,825	£-304,453
50	10%	614	25.2%	392	39.0%	£503,160	2.36	£304,663	£-198,496
55	10%	473	19.4%	268	36.1%	£370,319	2.50	£248,104	£-122,215
60	10%	353	14.5%	176	33.3%	£264,447	2.68	£198,562	£-65,885
65	10%	260	10.7%	111	29.9%	£185,281	2.88	£157,382	£-27,900
70	10%	188	7.7%	67	26.3%	£127,729	3.12	£123,322	£-4,407
75	10%	133	5.5%	39	22.7%	£85,999	3.45	£96,389	£10,390
80	10%	89	3.7%	23	20.2%	£55,901	3.83	£71,771	£15,871
85	10%	59	2.4%	11	15.8%	£34,758	4.36	£53,639	£18,881
90	10%	36	1.5%	5	11.6%	£20,204	5.11	£38,354	£18,150
95	10%	17	0.7%	2	8.9%	£9,581	6.39	£23,413	£13,832
0	15%	2,432	100.0%	6,568	73.0%	£4,500,007	1.78	£1,367,590	£-3,132,417
5	15%	2,432	100.0%	6,556	72.9%	£4,493,695	1.79	£1,367,425	£-3,126,270
10	15%	2,372	97.5%	5,718	70.7%	£4,044,976	1.80	£1,344,247	£-2,700,730
15	15%	2,192	90.1%	4,274	66.1%	£3,233,067	1.84	£1,267,228	£-1,965,839
20	15%	1,954	80.3%	3,090	61.3%	£2,522,005	1.89	£1,160,206	£-1,361,799
25	15%	1,683	69.2%	2,198	56.6%	£1,940,445	1.94	£1,028,724	£-911,721
30	15%	1,418	58.3%	1,563	52.4%	£1,490,770	2.01	£896,442	£-594,328
35	15%	1,179	48.5%	1,114	48.6%	£1,146,462	2.08	£773,471	£-372,991
40	15%	965	39.7%	800	45.3%	£882,520	2.16	£658,332	£-224,188
45	15%	778	32.0%	568	42.2%	£673,279	2.26	£553,238	£-120,041
50	15%	614	25.2%	392	39.0%	£503,160	2.36	£456,995	£-46,164
55	15%	473	19.4%	268	36.1%	£370,319	2.50	£372,155	£1,836
60	15%	353	14.5%	176	33.3%	£264,447	2.68	£297,843	£33,396
65	15%	260	10.7%	111	29.9%	£185,281	2.88	£236,072	£50,791
70	15%	188	7.7%	67	26.3%	£127,729	3.12	£184,982	£57,254
75	15%	133	5.5%	39	22.7%	£85,999	3.45	£144,584	£58,585
80	15%	89	3.7%	23	20.2%	£55,901	3.83	£107,657	£51,756
85	15%	59	2.4%	11	15.8%	£34,758	4.36	£80,458	£45,700
90	15%	36	1.5%	5	11.6%	£20,204	5.11	£57,531	£37,327
95	15%	17	0.7%	2	8.9%	£9,581	6.39	£35,119	£25,538
0	20%	2,432	100.0%	6,568	73.0%	£4,500,007	1.78	£1,823,453	£-2,676,554
5	20%	2,432	100.0%	6,556	72.9%	£4,493,695	1.79	£1,823,234	£-2,670,461
10	20%	2,372	97.5%	5,718	70.7%	£4,044,976	1.80	£1,792,329	£-2,252,647
15	20%	2,192	90.1%	4,274	66.1%	£3,233,067	1.84	£1,689,637	£-1,543,429
20	20%	1,954	80.3%	3,090	61.3%	£2,522,005	1.89	£1,546,942	£-975,063
25	20%	1,683	69.2%	2,198	56.6%	£1,940,445	1.94	£1,371,632	£-568,813
30	20%	1,418	58.3%	1,563	52.4%	£1,490,770	2.01	£1,195,256	£-295,514
35	20%	1,179	48.5%	1,114	48.6%	£1,146,462	2.08	£1,031,294	£-115,168
40	20%	965	39.7%	800	45.3%	£882,520	2.16	£877,776	£-4,744
45	20%	778	32.0%	568	42.2%	£673,279	2.26	£737,651	£64,372
50	20%	614	25.2%	392	39.0%	£503,160	2.36	£609,327	£106,167
55	20%	473	19.4%	268	36.1%	£370,319	2.50	£496,207	£125,888
60	20%	353	14.5%	176	33.3%	£264,447	2.68	£397,124	£132,677
65	20%	260	10.7%	111	29.9%	£185,281	2.88	£314,763	£129,482
70	20%	188	7.7%	67	26.3%	£127,729	3.12	£246,643	£118,915
75	20%	133	5.5%	39	22.7%	£85,999	3.45	£192,778	£106,779
80	20%	89	3.7%	23	20.2%	£55,901	3.83	£143,543	£87,642
85	20%	59	2.4%	11	15.8%	£34,758	4.36	£107,277	£72,520
90	20%	36	1.5%	5	11.6%	£20,204	5.11	£76,708	£56,504
95	20%	17	0.7%	2	8.9%	£9,581	6.39	£46,825	£37,245

PARR2 “Monthly Archival” Model Intervention Cost = £750

Business Case Modelling Using PARR2 Algorithm
“Monthly Archival” Model - Intervention Cost = £750
Typical PCT - 9,000 Patients with Emergency Admissions

Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£750/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	2,432	100.0%	6,568	73.0%	£6,750,011	1.78	£911,726	£-5,838,284
5	10%	2,432	100.0%	6,556	72.9%	£6,740,543	1.79	£911,617	£-5,828,926
10	10%	2,372	97.5%	5,718	70.7%	£6,067,464	1.80	£896,164	£-5,171,300
15	10%	2,192	90.1%	4,274	66.1%	£4,849,600	1.84	£844,819	£-4,004,781
20	10%	1,954	80.3%	3,090	61.3%	£3,783,007	1.89	£773,471	£-3,009,537
25	10%	1,683	69.2%	2,198	56.6%	£2,910,668	1.94	£685,816	£-2,224,852
30	10%	1,418	58.3%	1,563	52.4%	£2,236,154	2.01	£597,628	£-1,638,526
35	10%	1,179	48.5%	1,114	48.6%	£1,719,693	2.08	£515,647	£-1,204,046
40	10%	965	39.7%	800	45.3%	£1,323,780	2.16	£438,888	£-884,892
45	10%	778	32.0%	568	42.2%	£1,009,918	2.26	£368,825	£-641,093
50	10%	614	25.2%	392	39.0%	£754,739	2.36	£304,663	£-450,076
55	10%	473	19.4%	268	36.1%	£555,479	2.50	£248,104	£-307,375
60	10%	353	14.5%	176	33.3%	£396,670	2.68	£198,562	£-198,108
65	10%	260	10.7%	111	29.9%	£277,922	2.88	£157,382	£-120,540
70	10%	188	7.7%	67	26.3%	£191,593	3.12	£123,322	£-68,271
75	10%	133	5.5%	39	22.7%	£128,998	3.45	£96,389	£-32,609
80	10%	89	3.7%	23	20.2%	£83,851	3.83	£71,771	£-12,080
85	10%	59	2.4%	11	15.8%	£52,136	4.36	£53,639	£1,502
90	10%	36	1.5%	5	11.6%	£30,306	5.11	£38,354	£8,048
95	10%	17	0.7%	2	8.9%	£14,371	6.39	£23,413	£9,042
0	15%	2,432	100.0%	6,568	73.0%	£6,750,011	1.78	£1,367,590	£-5,382,421
5	15%	2,432	100.0%	6,556	72.9%	£6,740,543	1.79	£1,367,425	£-5,373,118
10	15%	2,372	97.5%	5,718	70.7%	£6,067,464	1.80	£1,344,247	£-4,723,218
15	15%	2,192	90.1%	4,274	66.1%	£4,849,600	1.84	£1,267,228	£-3,582,372
20	15%	1,954	80.3%	3,090	61.3%	£3,783,007	1.89	£1,160,206	£-2,622,801
25	15%	1,683	69.2%	2,198	56.6%	£2,910,668	1.94	£1,028,724	£-1,881,944
30	15%	1,418	58.3%	1,563	52.4%	£2,236,154	2.01	£896,442	£-1,339,713
35	15%	1,179	48.5%	1,114	48.6%	£1,719,693	2.08	£773,471	£-946,223
40	15%	965	39.7%	800	45.3%	£1,323,780	2.16	£658,332	£-665,448
45	15%	778	32.0%	568	42.2%	£1,009,918	2.26	£553,238	£-456,680
50	15%	614	25.2%	392	39.0%	£754,739	2.36	£456,995	£-297,744
55	15%	473	19.4%	268	36.1%	£555,479	2.50	£372,155	£-183,323
60	15%	353	14.5%	176	33.3%	£396,670	2.68	£297,843	£-98,827
65	15%	260	10.7%	111	29.9%	£277,922	2.88	£236,072	£-41,849
70	15%	188	7.7%	67	26.3%	£191,593	3.12	£184,982	£-6,611
75	15%	133	5.5%	39	22.7%	£128,998	3.45	£144,584	£15,586
80	15%	89	3.7%	23	20.2%	£83,851	3.83	£107,657	£23,806
85	15%	59	2.4%	11	15.8%	£52,136	4.36	£80,458	£28,322
90	15%	36	1.5%	5	11.6%	£30,306	5.11	£57,531	£27,225
95	15%	17	0.7%	2	8.9%	£14,371	6.39	£35,119	£20,748
0	20%	2,432	100.0%	6,568	73.0%	£6,750,011	1.78	£1,823,453	£-4,926,558
5	20%	2,432	100.0%	6,556	72.9%	£6,740,543	1.79	£1,823,234	£-4,917,309
10	20%	2,372	97.5%	5,718	70.7%	£6,067,464	1.80	£1,792,329	£-4,275,136
15	20%	2,192	90.1%	4,274	66.1%	£4,849,600	1.84	£1,689,637	£-3,159,963
20	20%	1,954	80.3%	3,090	61.3%	£3,783,007	1.89	£1,546,942	£-2,236,066
25	20%	1,683	69.2%	2,198	56.6%	£2,910,668	1.94	£1,371,632	£-1,539,036
30	20%	1,418	58.3%	1,563	52.4%	£2,236,154	2.01	£1,195,256	£-1,040,899
35	20%	1,179	48.5%	1,114	48.6%	£1,719,693	2.08	£1,031,294	£-688,399
40	20%	965	39.7%	800	45.3%	£1,323,780	2.16	£877,776	£-446,004
45	20%	778	32.0%	568	42.2%	£1,009,918	2.26	£737,651	£-272,267
50	20%	614	25.2%	392	39.0%	£754,739	2.36	£609,327	£-145,412
55	20%	473	19.4%	268	36.1%	£555,479	2.50	£496,207	£-59,271
60	20%	353	14.5%	176	33.3%	£396,670	2.68	£397,124	£454
65	20%	260	10.7%	111	29.9%	£277,922	2.88	£314,763	£36,841
70	20%	188	7.7%	67	26.3%	£191,593	3.12	£246,643	£55,050
75	20%	133	5.5%	39	22.7%	£128,998	3.45	£192,778	£63,780
80	20%	89	3.7%	23	20.2%	£83,851	3.83	£143,543	£59,692
85	20%	59	2.4%	11	15.8%	£52,136	4.36	£107,277	£55,141
90	20%	36	1.5%	5	11.6%	£30,306	5.11	£76,708	£46,402
95	20%	17	0.7%	2	8.9%	£14,371	6.39	£46,825	£32,454

**PARR2 “Monthly Archival” Model
Intervention Cost = £1,000**

Business Case Modelling Using PARR2 Algorithm
“Monthly Archival” Model - Intervention Cost = £1,000
Typical PCT - 9,000 Patients with Emergency Admissions

Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£1,000/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	2,432	100.0%	6,568	73.0%	£9,000,014	1.78	£911,726	£8,088,288
5	10%	2,432	100.0%	6,556	72.9%	£8,987,391	1.79	£911,617	£8,075,774
10	10%	2,372	97.5%	5,718	70.7%	£8,089,952	1.80	£896,164	£7,193,788
15	10%	2,192	90.1%	4,274	66.1%	£6,466,134	1.84	£844,819	£5,621,315
20	10%	1,954	80.3%	3,090	61.3%	£5,044,010	1.89	£773,471	£4,270,539
25	10%	1,683	69.2%	2,198	56.6%	£3,880,890	1.94	£685,816	£3,195,074
30	10%	1,418	58.3%	1,563	52.4%	£2,981,539	2.01	£597,628	£2,383,911
35	10%	1,179	48.5%	1,114	48.6%	£2,292,925	2.08	£515,647	£1,777,277
40	10%	965	39.7%	800	45.3%	£1,765,040	2.16	£438,888	£1,326,152
45	10%	778	32.0%	568	42.2%	£1,346,558	2.26	£368,825	£977,732
50	10%	614	25.2%	392	39.0%	£1,006,319	2.36	£304,663	£701,656
55	10%	473	19.4%	268	36.1%	£740,638	2.50	£248,104	£492,534
60	10%	353	14.5%	176	33.3%	£528,893	2.68	£198,562	£330,331
65	10%	260	10.7%	111	29.9%	£370,562	2.88	£157,382	£213,181
70	10%	188	7.7%	67	26.3%	£255,457	3.12	£123,322	£132,136
75	10%	133	5.5%	39	22.7%	£171,997	3.45	£96,389	£75,608
80	10%	89	3.7%	23	20.2%	£111,802	3.83	£71,771	£40,030
85	10%	59	2.4%	11	15.8%	£69,515	4.36	£53,639	£15,877
90	10%	36	1.5%	5	11.6%	£40,409	5.11	£38,354	£2,055
95	10%	17	0.7%	2	8.9%	£19,161	6.39	£23,413	£4,252
0	15%	2,432	100.0%	6,568	73.0%	£9,000,014	1.78	£1,367,590	£7,632,424
5	15%	2,432	100.0%	6,556	72.9%	£8,987,391	1.79	£1,367,425	£7,619,965
10	15%	2,372	97.5%	5,718	70.7%	£8,089,952	1.80	£1,344,247	£6,745,706
15	15%	2,192	90.1%	4,274	66.1%	£6,466,134	1.84	£1,267,228	£5,198,905
20	15%	1,954	80.3%	3,090	61.3%	£5,044,010	1.89	£1,160,206	£3,883,804
25	15%	1,683	69.2%	2,198	56.6%	£3,880,890	1.94	£1,028,724	£2,852,166
30	15%	1,418	58.3%	1,563	52.4%	£2,981,539	2.01	£896,442	£2,085,097
35	15%	1,179	48.5%	1,114	48.6%	£2,292,925	2.08	£773,471	£1,519,454
40	15%	965	39.7%	800	45.3%	£1,765,040	2.16	£658,332	£1,106,708
45	15%	778	32.0%	568	42.2%	£1,346,558	2.26	£553,238	£793,320
50	15%	614	25.2%	392	39.0%	£1,006,319	2.36	£456,995	£549,324
55	15%	473	19.4%	268	36.1%	£740,638	2.50	£372,155	£368,483
60	15%	353	14.5%	176	33.3%	£528,893	2.68	£297,843	£231,050
65	15%	260	10.7%	111	29.9%	£370,562	2.88	£236,072	£134,490
70	15%	188	7.7%	67	26.3%	£255,457	3.12	£184,982	£70,475
75	15%	133	5.5%	39	22.7%	£171,997	3.45	£144,584	£27,414
80	15%	89	3.7%	23	20.2%	£111,802	3.83	£107,657	£4,144
85	15%	59	2.4%	11	15.8%	£69,515	4.36	£80,458	£10,943
90	15%	36	1.5%	5	11.6%	£40,409	5.11	£57,531	£17,123
95	15%	17	0.7%	2	8.9%	£19,161	6.39	£35,119	£15,958
0	20%	2,432	100.0%	6,568	73.0%	£9,000,014	1.78	£1,823,453	£7,176,561
5	20%	2,432	100.0%	6,556	72.9%	£8,987,391	1.79	£1,823,234	£7,164,157
10	20%	2,372	97.5%	5,718	70.7%	£8,089,952	1.80	£1,792,329	£6,297,624
15	20%	2,192	90.1%	4,274	66.1%	£6,466,134	1.84	£1,689,637	£4,776,496
20	20%	1,954	80.3%	3,090	61.3%	£5,044,010	1.89	£1,546,942	£3,497,068
25	20%	1,683	69.2%	2,198	56.6%	£3,880,890	1.94	£1,371,632	£2,509,258
30	20%	1,418	58.3%	1,563	52.4%	£2,981,539	2.01	£1,195,256	£1,786,283
35	20%	1,179	48.5%	1,114	48.6%	£2,292,925	2.08	£1,031,294	£1,261,630
40	20%	965	39.7%	800	45.3%	£1,765,040	2.16	£877,776	£887,264
45	20%	778	32.0%	568	42.2%	£1,346,558	2.26	£737,651	£608,907
50	20%	614	25.2%	392	39.0%	£1,006,319	2.36	£609,327	£396,992
55	20%	473	19.4%	268	36.1%	£740,638	2.50	£496,207	£244,431
60	20%	353	14.5%	176	33.3%	£528,893	2.68	£397,124	£131,769
65	20%	260	10.7%	111	29.9%	£370,562	2.88	£314,763	£55,799
70	20%	188	7.7%	67	26.3%	£255,457	3.12	£246,643	£8,814
75	20%	133	5.5%	39	22.7%	£171,997	3.45	£192,778	£20,781
80	20%	89	3.7%	23	20.2%	£111,802	3.83	£143,543	£31,741
85	20%	59	2.4%	11	15.8%	£69,515	4.36	£107,277	£37,762
90	20%	36	1.5%	5	11.6%	£40,409	5.11	£76,708	£36,300
95	20%	17	0.7%	2	8.9%	£19,161	6.39	£46,825	£27,664

PARR2 “Annual Archival” Model Intervention Cost = £500

Business Case Modelling Using PARR2 Algorithm
“Annual Archival” Model - Intervention Cost = £500
Typical PCT - 9,000 Patients with Emergency Admissions

Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£500/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	1,933	100.0%	7067	78.5%	£4,499,970	1.75	£711,059	-£3,788,912
5	10%	1,922	99.4%	6752	77.8%	£4,336,788	1.76	£708,362	-£3,628,426
10	10%	1,794	92.8%	4927	73.3%	£3,360,776	1.79	£674,811	-£2,685,964
15	10%	1,581	81.8%	3322	67.7%	£2,451,918	1.85	£614,254	-£1,837,664
20	10%	1,350	69.8%	2254	62.5%	£1,802,272	1.92	£544,055	-£1,258,217
25	10%	1,130	58.4%	1560	58.0%	£1,344,900	2.00	£473,898	-£871,002
30	10%	925	47.9%	1083	53.9%	£1,004,349	2.09	£406,411	-£597,938
35	10%	749	38.7%	748	50.0%	£748,290	2.19	£345,043	-£403,247
40	10%	598	30.9%	519	46.5%	£558,598	2.32	£290,697	-£267,901
45	10%	473	24.4%	357	43.1%	£414,899	2.45	£243,548	-£171,351
50	10%	368	19.1%	242	39.7%	£305,306	2.62	£202,970	-£102,336
55	10%	283	14.6%	164	36.6%	£223,396	2.81	£167,264	-£56,131
60	10%	217	11.2%	107	33.2%	£161,976	3.03	£137,757	-£24,219
65	10%	163	8.4%	70	30.1%	£116,720	3.30	£112,953	-£3,766
70	10%	120	6.2%	46	27.4%	£83,000	3.61	£91,375	£8,375
75	10%	89	4.6%	29	24.8%	£58,838	3.98	£73,967	£15,129
80	10%	64	3.3%	18	22.1%	£41,030	4.40	£59,142	£18,112
85	10%	44	2.3%	10	18.6%	£27,164	4.97	£46,149	£18,985
90	10%	27	1.4%	5	15.4%	£16,164	5.89	£33,839	£17,675
95	10%	15	0.8%	2	11.9%	£8,300	7.61	£23,367	£15,067
0	15%	1,933	100.0%	7067	78.5%	£4,499,970	1.75	£1,066,588	-£3,433,382
5	15%	1,922	99.4%	6752	77.8%	£4,336,788	1.76	£1,062,542	-£3,274,245
10	15%	1,794	92.8%	4927	73.3%	£3,360,776	1.79	£1,012,217	-£2,348,558
15	15%	1,581	81.8%	3322	67.7%	£2,451,918	1.85	£921,381	-£1,530,538
20	15%	1,350	69.8%	2254	62.5%	£1,802,272	1.92	£816,082	-£986,190
25	15%	1,130	58.4%	1560	58.0%	£1,344,900	2.00	£710,848	-£634,053
30	15%	925	47.9%	1083	53.9%	£1,004,349	2.09	£609,616	-£394,733
35	15%	749	38.7%	748	50.0%	£748,290	2.19	£517,565	-£230,726
40	15%	598	30.9%	519	46.5%	£558,598	2.32	£436,045	-£122,552
45	15%	473	24.4%	357	43.1%	£414,899	2.45	£365,322	-£49,577
50	15%	368	19.1%	242	39.7%	£305,306	2.62	£304,454	-£851
55	15%	283	14.6%	164	36.6%	£223,396	2.81	£250,897	£27,501
60	15%	217	11.2%	107	33.2%	£161,976	3.03	£206,635	£44,659
65	15%	163	8.4%	70	30.1%	£116,720	3.30	£169,430	£52,710
70	15%	120	6.2%	46	27.4%	£83,000	3.61	£137,063	£54,063
75	15%	89	4.6%	29	24.8%	£58,838	3.98	£110,950	£52,112
80	15%	64	3.3%	18	22.1%	£41,030	4.40	£88,713	£47,683
85	15%	44	2.3%	10	18.6%	£27,164	4.97	£69,223	£42,060
90	15%	27	1.4%	5	15.4%	£16,164	5.89	£50,758	£34,594
95	15%	15	0.8%	2	11.9%	£8,300	7.61	£35,050	£26,750
0	20%	1,933	100.0%	7067	78.5%	£4,499,970	1.75	£1,422,118	-£3,077,853
5	20%	1,922	99.4%	6752	77.8%	£4,336,788	1.76	£1,416,723	-£2,920,065
10	20%	1,794	92.8%	4927	73.3%	£3,360,776	1.79	£1,349,623	-£2,011,153
15	20%	1,581	81.8%	3322	67.7%	£2,451,918	1.85	£1,228,507	-£1,223,411
20	20%	1,350	69.8%	2254	62.5%	£1,802,272	1.92	£1,088,110	-£714,162
25	20%	1,130	58.4%	1560	58.0%	£1,344,900	2.00	£947,797	-£397,104
30	20%	925	47.9%	1083	53.9%	£1,004,349	2.09	£812,822	-£191,528
35	20%	749	38.7%	748	50.0%	£748,290	2.19	£690,086	-£58,204
40	20%	598	30.9%	519	46.5%	£558,598	2.32	£581,394	£22,796
45	20%	473	24.4%	357	43.1%	£414,899	2.45	£487,096	£72,197
50	20%	368	19.1%	242	39.7%	£305,306	2.62	£405,939	£100,633
55	20%	283	14.6%	164	36.6%	£223,396	2.81	£334,529	£111,133
60	20%	217	11.2%	107	33.2%	£161,976	3.03	£275,513	£113,538
65	20%	163	8.4%	70	30.1%	£116,720	3.30	£225,907	£109,187
70	20%	120	6.2%	46	27.4%	£83,000	3.61	£182,751	£99,751
75	20%	89	4.6%	29	24.8%	£58,838	3.98	£147,933	£89,095
80	20%	64	3.3%	18	22.1%	£41,030	4.40	£118,284	£77,254
85	20%	44	2.3%	10	18.6%	£27,164	4.97	£92,298	£65,134
90	20%	27	1.4%	5	15.4%	£16,164	5.89	£67,678	£51,514
95	20%	15	0.8%	2	11.9%	£8,300	7.61	£46,733	£38,433

PARR2 “Annual Archival” Model Intervention Cost = £750

Business Case Modelling Using PARR2 Algorithm
“Annual Archival” Model - Intervention Cost = £750
Typical PCT - 9,000 Patients with Emergency Admissions

Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£750/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	1,933	100.0%	7067	78.5%	£6,749,956	1.75	£711,059	-£6,038,897
5	10%	1,922	99.4%	6752	77.8%	£6,505,181	1.76	£708,362	-£5,796,820
10	10%	1,794	92.8%	4927	73.3%	£5,041,163	1.79	£674,811	-£4,366,352
15	10%	1,581	81.8%	3322	67.7%	£3,677,877	1.85	£614,254	-£3,063,624
20	10%	1,350	69.8%	2254	62.5%	£2,703,408	1.92	£544,055	-£2,159,353
25	10%	1,130	58.4%	1560	58.0%	£2,017,351	2.00	£473,898	-£1,543,452
30	10%	925	47.9%	1083	53.9%	£1,506,524	2.09	£406,411	-£1,100,113
35	10%	749	38.7%	748	50.0%	£1,122,436	2.19	£345,043	-£777,392
40	10%	598	30.9%	519	46.5%	£837,897	2.32	£290,697	-£547,200
45	10%	473	24.4%	357	43.1%	£622,348	2.45	£243,548	-£378,801
50	10%	368	19.1%	242	39.7%	£457,958	2.62	£202,970	-£254,989
55	10%	283	14.6%	164	36.6%	£335,093	2.81	£167,264	-£167,829
60	10%	217	11.2%	107	33.2%	£242,963	3.03	£137,757	-£105,207
65	10%	163	8.4%	70	30.1%	£175,080	3.30	£112,953	-£62,126
70	10%	120	6.2%	46	27.4%	£124,500	3.61	£91,375	-£33,125
75	10%	89	4.6%	29	24.8%	£88,257	3.98	£73,967	-£14,290
80	10%	64	3.3%	18	22.1%	£61,546	4.40	£59,142	-£2,403
85	10%	44	2.3%	10	18.6%	£40,745	4.97	£46,149	£5,404
90	10%	27	1.4%	5	15.4%	£24,246	5.89	£33,839	£9,593
95	10%	15	0.8%	2	11.9%	£12,450	7.61	£23,367	£10,917
0	15%	1,933	100.0%	7067	78.5%	£6,749,956	1.75	£1,066,588	-£5,683,368
5	15%	1,922	99.4%	6752	77.8%	£6,505,181	1.76	£1,062,542	-£5,442,639
10	15%	1,794	92.8%	4927	73.3%	£5,041,163	1.79	£1,012,217	-£4,028,946
15	15%	1,581	81.8%	3322	67.7%	£3,677,877	1.85	£921,381	-£2,756,497
20	15%	1,350	69.8%	2254	62.5%	£2,703,408	1.92	£816,082	-£1,887,326
25	15%	1,130	58.4%	1560	58.0%	£2,017,351	2.00	£710,848	-£1,306,503
30	15%	925	47.9%	1083	53.9%	£1,506,524	2.09	£609,616	-£896,908
35	15%	749	38.7%	748	50.0%	£1,122,436	2.19	£517,565	-£604,871
40	15%	598	30.9%	519	46.5%	£837,897	2.32	£436,045	-£401,851
45	15%	473	24.4%	357	43.1%	£622,348	2.45	£365,322	-£257,027
50	15%	368	19.1%	242	39.7%	£457,958	2.62	£304,454	-£153,504
55	15%	283	14.6%	164	36.6%	£335,093	2.81	£250,897	-£84,197
60	15%	217	11.2%	107	33.2%	£242,963	3.03	£206,635	-£36,328
65	15%	163	8.4%	70	30.1%	£175,080	3.30	£169,430	-£5,650
70	15%	120	6.2%	46	27.4%	£124,500	3.61	£137,063	£12,563
75	15%	89	4.6%	29	24.8%	£88,257	3.98	£110,950	£22,693
80	15%	64	3.3%	18	22.1%	£61,546	4.40	£88,713	£27,168
85	15%	44	2.3%	10	18.6%	£40,745	4.97	£69,223	£28,478
90	15%	27	1.4%	5	15.4%	£24,246	5.89	£50,758	£26,512
95	15%	15	0.8%	2	11.9%	£12,450	7.61	£35,050	£22,600
0	20%	1,933	100.0%	7067	78.5%	£6,749,956	1.75	£1,422,118	-£5,327,838
5	20%	1,922	99.4%	6752	77.8%	£6,505,181	1.76	£1,416,723	-£5,088,458
10	20%	1,794	92.8%	4927	73.3%	£5,041,163	1.79	£1,349,623	-£3,691,541
15	20%	1,581	81.8%	3322	67.7%	£3,677,877	1.85	£1,228,507	-£2,449,370
20	20%	1,350	69.8%	2254	62.5%	£2,703,408	1.92	£1,088,110	-£1,615,298
25	20%	1,130	58.4%	1560	58.0%	£2,017,351	2.00	£947,797	-£1,069,554
30	20%	925	47.9%	1083	53.9%	£1,506,524	2.09	£812,822	-£693,702
35	20%	749	38.7%	748	50.0%	£1,122,436	2.19	£690,086	-£432,349
40	20%	598	30.9%	519	46.5%	£837,897	2.32	£581,394	-£256,503
45	20%	473	24.4%	357	43.1%	£622,348	2.45	£487,096	-£135,253
50	20%	368	19.1%	242	39.7%	£457,958	2.62	£405,939	-£52,019
55	20%	283	14.6%	164	36.6%	£335,093	2.81	£334,529	-£564
60	20%	217	11.2%	107	33.2%	£242,963	3.03	£275,513	£32,550
65	20%	163	8.4%	70	30.1%	£175,080	3.30	£225,907	£50,827
70	20%	120	6.2%	46	27.4%	£124,500	3.61	£182,751	£58,251
75	20%	89	4.6%	29	24.8%	£88,257	3.98	£147,933	£59,676
80	20%	64	3.3%	18	22.1%	£61,546	4.40	£118,284	£56,739
85	20%	44	2.3%	10	18.6%	£40,745	4.97	£92,298	£51,553
90	20%	27	1.4%	5	15.4%	£24,246	5.89	£67,678	£43,432
95	20%	15	0.8%	2	11.9%	£12,450	7.61	£46,733	£34,283

**PARR2 “Annual Archival” Model
Intervention Cost = £1,000**

Business Case Modelling Using PARR2 Algorithm
“Annual Archival” Model - Intervention Cost = £1,000
Typical PCT - 9,000 Patients with Emergency Admissions

Risk Score Threshold Cutoff	Admission Reduction Assumption	Number of Admitted Patients Identified	Percent of Admitted Patients Identified	Number of Non-Admitted Patients Flagged (Incorrectly)	Percent of Flagged Patients Not Admitted	Total Intervention Cost (£1,000/Pat)	Adms w/in 12mos for Correctly Flagged Patients	Intervention Savings (£2,100/Adm)	Net Savings or Loss
0	10%	1,933	100.0%	7067	78.5%	£8,999,941	1.75	£711,059	£-8,288,882
5	10%	1,922	99.4%	6752	77.8%	£8,673,575	1.76	£708,362	£-7,965,214
10	10%	1,794	92.8%	4927	73.3%	£6,721,551	1.79	£674,811	£-6,046,740
15	10%	1,581	81.8%	3322	67.7%	£4,903,836	1.85	£614,254	£-4,289,583
20	10%	1,350	69.8%	2254	62.5%	£3,604,544	1.92	£544,055	£-3,060,489
25	10%	1,130	58.4%	1560	58.0%	£2,689,801	2.00	£473,898	£-2,215,903
30	10%	925	47.9%	1083	53.9%	£2,008,699	2.09	£406,411	£-1,602,288
35	10%	749	38.7%	748	50.0%	£1,496,581	2.19	£345,043	£-1,151,538
40	10%	598	30.9%	519	46.5%	£1,117,196	2.32	£290,697	£-826,499
45	10%	473	24.4%	357	43.1%	£829,798	2.45	£243,548	£-586,250
50	10%	368	19.1%	242	39.7%	£610,611	2.62	£202,970	£-407,642
55	10%	283	14.6%	164	36.6%	£446,791	2.81	£167,264	£-279,527
60	10%	217	11.2%	107	33.2%	£323,951	3.03	£137,757	£-186,194
65	10%	163	8.4%	70	30.1%	£233,439	3.30	£112,953	£-120,486
70	10%	120	6.2%	46	27.4%	£166,000	3.61	£91,375	£-74,624
75	10%	89	4.6%	29	24.8%	£117,675	3.98	£73,967	£-43,709
80	10%	64	3.3%	18	22.1%	£82,061	4.40	£59,142	£-22,919
85	10%	44	2.3%	10	18.6%	£54,327	4.97	£46,149	£-8,178
90	10%	27	1.4%	5	15.4%	£32,328	5.89	£33,839	£1,511
95	10%	15	0.8%	2	11.9%	£16,600	7.61	£23,367	£6,767
0	15%	1,933	100.0%	7067	78.5%	£8,999,941	1.75	£1,066,588	£-7,933,353
5	15%	1,922	99.4%	6752	77.8%	£8,673,575	1.76	£1,062,542	£-7,611,033
10	15%	1,794	92.8%	4927	73.3%	£6,721,551	1.79	£1,012,217	£-5,709,334
15	15%	1,581	81.8%	3322	67.7%	£4,903,836	1.85	£921,381	£-3,982,456
20	15%	1,350	69.8%	2254	62.5%	£3,604,544	1.92	£816,082	£-2,788,462
25	15%	1,130	58.4%	1560	58.0%	£2,689,801	2.00	£710,848	£-1,978,953
30	15%	925	47.9%	1083	53.9%	£2,008,699	2.09	£609,616	£-1,399,082
35	15%	749	38.7%	748	50.0%	£1,496,581	2.19	£517,565	£-979,016
40	15%	598	30.9%	519	46.5%	£1,117,196	2.32	£436,045	£-681,150
45	15%	473	24.4%	357	43.1%	£829,798	2.45	£365,322	£-464,476
50	15%	368	19.1%	242	39.7%	£610,611	2.62	£304,454	£-306,157
55	15%	283	14.6%	164	36.6%	£446,791	2.81	£250,897	£-195,894
60	15%	217	11.2%	107	33.2%	£323,951	3.03	£206,635	£-117,316
65	15%	163	8.4%	70	30.1%	£233,439	3.30	£169,430	£-64,009
70	15%	120	6.2%	46	27.4%	£166,000	3.61	£137,063	£-28,937
75	15%	89	4.6%	29	24.8%	£117,675	3.98	£110,950	£-6,726
80	15%	64	3.3%	18	22.1%	£82,061	4.40	£88,713	£6,652
85	15%	44	2.3%	10	18.6%	£54,327	4.97	£69,223	£14,896
90	15%	27	1.4%	5	15.4%	£32,328	5.89	£50,758	£18,430
95	15%	15	0.8%	2	11.9%	£16,600	7.61	£35,050	£18,450
0	20%	1,933	100.0%	7067	78.5%	£8,999,941	1.75	£1,422,118	£-7,577,823
5	20%	1,922	99.4%	6752	77.8%	£8,673,575	1.76	£1,416,723	£-7,256,852
10	20%	1,794	92.8%	4927	73.3%	£6,721,551	1.79	£1,349,623	£-5,371,928
15	20%	1,581	81.8%	3322	67.7%	£4,903,836	1.85	£1,228,507	£-3,675,329
20	20%	1,350	69.8%	2254	62.5%	£3,604,544	1.92	£1,088,110	£-2,516,434
25	20%	1,130	58.4%	1560	58.0%	£2,689,801	2.00	£947,797	£-1,742,004
30	20%	925	47.9%	1083	53.9%	£2,008,699	2.09	£812,822	£-1,195,877
35	20%	749	38.7%	748	50.0%	£1,496,581	2.19	£690,086	£-806,494
40	20%	598	30.9%	519	46.5%	£1,117,196	2.32	£581,394	£-535,802
45	20%	473	24.4%	357	43.1%	£829,798	2.45	£487,096	£-342,702
50	20%	368	19.1%	242	39.7%	£610,611	2.62	£405,939	£-204,672
55	20%	283	14.6%	164	36.6%	£446,791	2.81	£334,529	£-112,262
60	20%	217	11.2%	107	33.2%	£323,951	3.03	£275,513	£-48,438
65	20%	163	8.4%	70	30.1%	£233,439	3.30	£225,907	£-7,533
70	20%	120	6.2%	46	27.4%	£166,000	3.61	£182,751	£16,751
75	20%	89	4.6%	29	24.8%	£117,675	3.98	£147,933	£30,258
80	20%	64	3.3%	18	22.1%	£82,061	4.40	£118,284	£36,224
85	20%	44	2.3%	10	18.6%	£54,327	4.97	£92,298	£37,971
90	20%	27	1.4%	5	15.4%	£32,328	5.89	£67,678	£35,350
95	20%	15	0.8%	2	11.9%	£16,600	7.61	£46,733	£30,133

APPENDIX D

QUICK REFERENCE GUIDE TO USING THE PARR+ ACCESS PROGRAMME FOR THE PARR1 AND PARR2 ALGORITHMS

QUICK REFERENCE GUIDE TO USING THE PARR+ ACCESS PROGRAM FOR THE PARR1 AND PARR2 ALGORITHMS

INTRODUCTION

The PARR+ Access program is designed to enable you to apply either or both of the PARR1 and PARR2 algorithms to local databases (at the SHA, PCT or practice level) using a “real time” method or a monthly or an annual archival method. The program itself is available on the King’s Fund website at:

www.kingsfund.org.uk/parr

Detailed instructions and Help utilities are embedded in the program, but this Guide is intended to provide a “quick start”. (The text of all the Help files is listed in the Appendix to this Guide.)

The PARR+ application is shipped as a zip file, from which all files will need to be extracted to a temporary directory. To install the application, double-click on 'Setup.exe', and a standard wizard will guide you through the installation process. This will also create a link to the application in the Startup menu under 'Parr+' so that you can access it more easily. If an earlier version of the database has already been installed, remove it by going to the Windows Control Panel and then selecting 'Add or Remove programs', clicking on 'Parr+' and choosing 'Remove'.

When you first access the database, typically by double-clicking its icon, PARR+ will present a disclaimer screen. You will only see this screen the first time the application is run, or until the 'Accept' button is pressed. (If you press the 'Decline' button instead, the database will not be accessed.) Once you have pressed 'Accept', PARR+ will carry out a one-time step to build its internal indexes – this is done to minimize the size of the shipped file.

IMPORTING AND PREPARING DATA FOR ANALYSIS

Data preparation and formatting

There are two main types of data to be imported: archived data (four years of previous hospital use by patients) and periodically updated data (on a monthly or daily/”real time” basis). It is expected that most PARR+ users will import the four-year archived data once only and then periodically update it on a monthly or daily basis. PARR+ supports each data set as a comma-separated-value (csv) file, a Microsoft Access table or a spreadsheet. Please note that headings must be in the same format as the data, and that the names of variables must be exactly as listed in the tables in this Guide. If particular values are not available, leave the relevant fields blank or NULL, but make sure that the placeholder columns for the missing values are specified.

For the four-year archive, constrain the data to the most recent four-year period of admissions. Similarly, constrain updated monthly data to the most recent month that is

being added to the archival database. Both the four-year archival data and the monthly updates to it should have the following format:

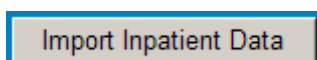
	Field Type	Field Description	Comments
PRVDR	Text	Provider Trust	The three-digit provider code (trust code) for the trust where the patient was admitted.
NHSNO	Text	Patient's NHS Number	
PSTCD	Text	Patient's Postcode	Ensure this is in the correct format: Positions 1-4 contain left-justified characters and may contain trailing spaces. There is a space in position 5, and non-space characters in positions 6-8. For example: B1 3XT, B11 5TG, EC1 3BN, GU26 8PQ
SEX	Number	Patient's Sex	Male = 1, Female = 2
BRTHDT	Date/Time	Patient's Date of Birth	
AGE	Number	Patient's Age	The patient's age at the start of the episode.
ETHN_ORGN	Text	Patient's Ethnic Origin	Use the 2001 Census classification. However, the algorithm will work with previous ethnicity codes.
HPSPLL_SD	Date/Time	Admission Date	Use the same date for all episodes within a spell.
ADM_METH	Number	Admission Method	Use the admission method code as defined in the HES data dictionary.
SPCLTY	Text	Treatment Specialty	Use the treatment specialty code for each episode, and not the main specialty of the consultant.
DIAG	Text	Primary Diagnosis	ICD 10 codes. Ensure that each code is four characters long and does not contain a full stop. If only three-digit codes are available, assign "X" as the fourth character.
DIAG2	Text	1st Secondary Diagnosis	ICD 10 codes. Ensure that each code is four characters long and does not contain a full stop. If only three-digit codes are available, assign "X" as the fourth character.
DIAG3	Text	2nd Secondary Diagnosis	ICD 10 codes. Ensure that each code is four characters long and does not contain a full stop. If only three-digit codes are available, assign "X" as the fourth character.
DIAG4	Text	3rd Secondary Diagnosis	ICD 10 codes. Ensure that each code is four characters long and does not contain a full stop. If only three-digit codes are available, assign "X" as the fourth character.
DIAG5	Text	4th Secondary Diagnosis	ICD 10 codes. Ensure that each code is four characters long and does not contain a full stop. If only three-digit codes are available, assign "X" as the fourth character.
DIAG6	Text	5th Secondary Diagnosis	ICD 10 codes. Ensure that each code is four characters long and does not contain a full stop. If only three-digit codes are available, assign "X" as the fourth character.
HRG	Text	Episode HRG	Use the HRG originally assigned to each episode, and not the dominant HRG for the spell.
Purchaser_ID	Text	Primary Care Trust Code	
Practice_Code	Text	GP Practice Code	
CLASS_PAT	Number	Patient Classification Code	Use the patient classification code as defined in the HES data dictionary.
DSCH_METH	Number	Discharge Method	Use the discharge method code as defined in the HES data dictionary.
HPSPLL_ED	Date/Time	Discharge Date	Use the same date for all episodes within a spell.
EPIORDER	Number	Episode Sequence Number	OPTIONAL: Assign a number to this episode-record within a given spell.

“Real time” processing using PARR1 requires data about the admitting diagnosis for each patient; for PARR2, this information is not required. “Real time” updates of daily admissions data should have the following format (for PARR2, the fields for diagnoses can be blank):

Field Name	Field Type	Field Description	Comments
NHSNO	Text	Patient's NHS Number	Required.
HPSPLL_SD	Date	Date of Emergency Admission	Required.
DIAGNOSIS	Text	Primary A&E Diagnosis	ICD 10 codes. Ensure that each code is four characters long and does not contain a full stop. If only three-digit codes are available, assign "X" as the fourth character. Value is optional for PARR2.
DIAGNOSIS2	Text	Secondary A&E Diagnosis	ICD 10 codes. Ensure that each code is four characters long and does not contain a full stop. If only three-digit codes are available, assign "X" as the fourth character. Value is optional for PARR2.
Purchaser_ID	Text	Primary Care Trust Code	Value is optional for PARR2.
Practice_Code	Text	GP Practice Code	Value is optional for PARR2.
CLASS_PAT	Number	Patient Classification Code	Use the patient classification code as defined in the HES data dictionary. Value is required and must be either 1 or 5 for an admission to qualify for risk evaluation.
DSCH_METH	Number	Discharge Method	Use the discharge method code as defined in the HES data dictionary. Value is optional for PARR2.

Importing the data

To import the four-year archival data, open the PARR+ Access program (we shall refer to the display that appears as the “main form”) and click on this button at upper right:



The “Import InPatient data” form will appear:

 A screenshot of a web-based application window titled "PARR+ (Import)". The window has a blue header with the NHS logo and the text "PARR+ : Patients at Risk of Re-Hospitalisation". Below the header, there is a red button labeled "Import InPatient data" and a grey button labeled "Import". The main content area is divided into two sections: "Select source of Import:" with radio buttons for "Csv", "Access", and "Excel"; and "Select type of Import:" with radio buttons for "Monthly" and "Annual". Below these sections, there is a "File:" field containing the path "C:\projects\NHS\PARR\HLP\Example.mdb" and a "Table:" dropdown menu currently showing "Annual_2005_02". A list of other tables is visible below the dropdown: "Annual_2005_02", "Daily_2005_03_31", and "Monthly_2005_03". To the right of the table list are "Help" and "Return" buttons. At the bottom left, there is a "Mess" icon and a table with columns "Type", "Date", and "Message", containing one row: "Activity", "1/18/2006 4:20:57 PM", "Purge completed". The footer contains logos for "King's Fund", "NYU Center for Health and Public Service Research", and "Health Dialog Analytic Solutions".

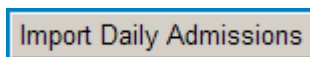
First click on “Annual” in the “Select type of Import” section, and select the data format (csv, Access or Excel) in the “Select source of Import” section. Specify the file on your computer that contains the data to be imported, by clicking on the file-folder icon near the centre of the form. Finally, click on the “Import” button at upper right.

The import function will examine the database to identify and delete duplicate records. In the activity/message panel at the bottom centre of the window, you will see messages describing the number of records imported, the quality of the data, the number of duplicates removed and so on:

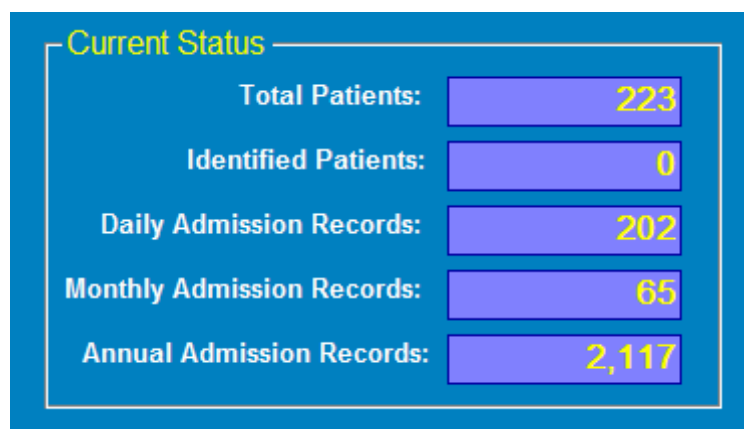
Type	Date	Message
Activity	11/18/2005 10:10:22 AM	Removed 2 deceased patients
Activity	11/18/2005 10:10:22 AM	Rejected 0 blank records
Activity	11/18/2005 10:10:22 AM	Rejected 17 duplicate records
Activity	11/18/2005 10:10:22 AM	Imported 2178 inpatient records
Info	11/18/2005 10:10:20 AM	Beginning import of database C:\projects\NHS\PARR\Hlp\Example.mdb, Table Annu
Activity	11/18/2005 10:10:04 AM	Purge completed

To import monthly updates, you follow a similar process. First, click on the “Import Inpatient Data” button on the main form; then select the file and the file format; then click on the “Import” button.

To import “real time” daily updates, on the main form click on the “Import Daily Admissions” button:



Once the annual/archived, monthly or daily data has been imported and the dialog box tracking import progress has closed, click on the “Return” button to return to the main form, where the “Current Status” panel will show how many of each type of record are currently held in the database:

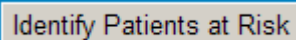


Removing “stale” data

Because most users plan to update the four-year archived data on a monthly or daily basis, it is important to make sure that the database to be analysed contains only four years’ worth of data (in addition to any newly added data). Accordingly, you should remove “stale” data – anything more than four years older than the beginning of the most recently imported data. For example, if you are importing monthly updated data for patients admitted during November 2005, remove any data for the period before 1 October 2001. You do so by clicking on the “Delete” button on the main form and specifying the cut-off date (in this case, 31-September-2001).

RUNNING THE ALGORITHM

To run a specified algorithm, click this button on the main form:

A rectangular button with a blue border and a light blue background, containing the text "Identify Patients at Risk" in a dark blue font.

In the panel that appears, first select either PARR1 (for patients admitted with “reference” conditions) or PARR2 (any emergency-admission patient) and indicate whether you are running the algorithm for the most recent full year of the database (“Annual”), the most recent month’s data (“Monthly”), or “real time”/daily for the current day’s admissions (“Daily”).

Now specify a threshold for the risk scores that will be produced. If you want to show scores for all patients, specify “0”. If you want to see scores for only those patients with a score of at least 50, enter “50”; for patients with a score of at least 75, enter “75”, and so on. You will also be asked to select a password to encrypt identifiable information for output.

Finally, to run the algorithm and generate risk scores, click this button:

A rectangular button with a blue border and a light grey background, containing the text "Identify" in a dark blue font.

PARR+ then creates a report in the format below, which can be printed directly from the program itself (via the “File” menu for the Access program while the report window is open) or can be exported in csv, Excel or Access format for further analysis (click on the “Export” button at upper right). The password you specified before creating the report in PARR+ is required to open the report in the program you will use for analysis. For Microsoft Excel, output will be found on the “PARRExport” worksheet tab.

NHS Reporting Risks: Patients at Risk of Re-hospitalisation

NHSNO	PCT	Practice	Risk		HRG	Diagnosis	Specialty
			Prior	Current			
02y3wzwf0s	NN900	NN3006		68.80	D15 E08 E18 E33 E99	I501	300 320 410 430
uvap314orx	NN900	NN3018		56.78	D10 D11 E14 E15 E34 F63 F64 F65 G15 U01	I251	100 101 300 301 320 340

PARR+ helps you to analyse changing risks. If patients with records in the most recent run of the algorithm also received one or more risk scores in previous runs, the risk score from the most recent previous run is also displayed, as below:

NHSNO	PCT	Practice	Risk		HRG	Diagnosis	Specialty
			Prior	Current			
82zwv6xu zu	NN900	NN3011	55.34	63.42	E18 E99 L46 L47 L51 Q17 S19	T824	100 300 361

GETTING MORE HELP

Context-specific help is available within the program itself. For more detailed information on how to use the program while it is running, click on the “Help” button at the lower right on any PARR+ display. To review the detailed Help instructions directly, you can double-click on the file-name “PARRPlus.htm” in the Hlp subdirectory. Also, at any point when running PARR+, you can return to the previous display by clicking on the “Return” button at the lower right of the display. See also the Technical Guidance available on the King’s Fund website.