S83 AN ECONOMIC EVALUATION OF DOMICILIARY NON-INVASIVE VENTILATION (NIV) IN PATIENTS WITH END-STAGE COPD IN THE UK

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10.1136/thoraxjnl-2014-206260.89

This abstract summarises independent research funded by the National Institute for Health Research (NIHR) under its HTA Programme (Ref 11/27/01). The views expressed are those of the author (s) and not necessarily those of the NHS, the NIHR or the Department of Health.

Background NIV is an established treatment for the management of acute exacerbation of COPD but less is known about the effectiveness of NIV in the home setting. Many clinicians consider domiciliary NIV to be cost-effective in patients that have experienced three or more exacerbations however no economic evaluations, using decision modelling have been conducted.

Methods The findings of a systematic clinical review of the clinical effectiveness of domiciliary NIV in COPD were applied in a Markov model, to estimate cost-effectiveness, from a UK perspective, when compared to usual care. Outcomes were measured in Quality Adjust Life Years (QALYs). Two end-stage COPD populations were considered; patients that were stable for at least twelve weeks (stable population) and those recently discharged for exacerbation (post-admission population). Given the uncertainty around the effect of domiciliary NIV on admissions and mortality in both populations, extensive sensitivity analysis was conducted to quantify and likelihood of NIV being cost-effective at a thresholds of £30,000 per QALY and the model's sensitivity to key parameters.

Results This model indicated that domiciliary NIV is unlikely to be cost-effective in stable populations but is more likely to be cost-effective post-admission. However, there was considerable uncertainty around the results for both populations. The model was most sensitive to changes in the risk ratio for admission and the duration of the effect but was also sensitive to changes in baseline risk of admissions.

Conclusion This model indicates that domiciliary NIV is unlikely to be cost-effective in stable patients but maybe cost-effective in patients with a history of admissions. This speculative economic model describes the uncertainty around these conclusions.

S84 IS THERE A RELATIONSHIP BETWEEN ACCEPTANCE OF REFERRAL TO SMOKING CESSATION SERVICES OR PULMONARY REHABILITATION AND READMISSION RATES FOR PATIENTS WITH COPD?

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10.1136/thoraxjnl-2014-206260.90

Introduction Readmission to hospital following an acute exacerbation of COPD is a significant burden to patients and health providers. Care bundles are increasingly used to support hospital discharges of patients admitted with an exacerbation of COPD. Referral to smoking cessation, nicotine replacement therapy and pulmonary rehabilitation services are key elements of COPD care bundles but it is not known if uptake to these interventions predicts readmission.

Methods This was a retrospective audit of patients who received a COPD discharge care bundle from April 2012 to March 2014. The care bundle was delivered by the nurse specialists in the Respiratory Discharge Service (REDS). The REDS team follow care bundle patients up for a period of 15 days after hospital discharge. Referral to smoking cessation, Nicotine Replacement Therapy (NRT) and pulmonary rehabilitation services was recorded, along with15 day readmission status as part of usual clinical outcomes. Between group-comparisons were analysed using chi-squared tests with the significance level set at $p < 0.05$.

Results 15 day readmission status, smoking cessation NRT and PR referral was recorded for 1891 patients (mean (SD) age 71.23 (10.32) yrs, 54.1% male, 40.5% current smokers) who received the care bundle prior to discharge. A total of 269 patients readmitted at 15 days (see table). There was a significant difference between smoking cessation uptake and readmission status ($p = 0.004$). There were no between-group differences in respect of readmission status and pulmonary rehabilitation or readmission status and NRT or ($p = 0.323$ and $p = 0.110$ respectively).

Conclusions Patients who accept a referral to smoking cessation services following an admission for an exacerbation of COPD may be less likely to readmit to hospital after 15 days but there is no relationship between acceptance of referral to pulmonary rehabilitation and NRT services and 15 day readmission status.

S85 EFFECTS OF POST EXACERBATION PULMONARY REHABILITATION (PEPR) ON EXERCISE TOLERANCE, QUALITY OF LIFE (QOL) AND HEALTH CARE UTILISATION

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10.1136/thoraxjnl-2014-206260.91

Background PEPR has been shown to increase exercise tolerance, improve QoL and cut the cost of healthcare through reducing 30 day readmissions and A&E attendances (NICE 2010). Further research into the impact of PEPR on QoL and healthcare utilisation has been called for (NICE 2010). The feasibility of PEPR in practice has yet to be established (Jones *et al*

Abstract S84 Table 1

	Smoking cessation referral (n)			Pulmonary Rehabilitation Referral (n)			NRT Uptake (n)		
15 day readmission status	Yes	No	Non /Ex smoker	Yes	No	N/A	Yes	No	Non / Ex smoker
Readmitted	35	52	182	130	104	35	42	18	209
Did not readmit	331	328	944	770	640	193	317	118	1168
Died	0	6	13	6	12	1	0	2	17

Abstract S85 Table 1 30 and 90 day readmissions and A&E attendances by group

	Declined to attend PEPR n = 34	Completed PEPR n = 2	p value (Chi^2)
30 day readmission%(n=)	18% (n = 6)	0% (n = 0)	p = 0.046
90 day readmission%(n=)	29% (n = 10)	5% (n = 1)	p = 0.031
30 day A&E attendance%(n=)	15% (n = 5)	0% (n = 0)	p = 0.072
90 day A&E attendance%(n=)	38% (n = 13)	5% (n = 1)	p = 0.007

2013, Thorax). We secured funding to pilot PEPR in our local DGH population. Here, we present the initial five months data.

Aims and objectives This study aimed to investigate the impact of PEPR on exercise tolerance, QoL and health care utilisation in a local DGH population.

Methods Data were collected prospectively from successive patients referred for PEPR between December 2012 and May 2014. Outcome measures consisted of ISWT and QoL (CAT). Healthcare utilisation was measured through 30 and 90 day readmission and A&E attendance rates. Descriptive statistics and significance values were calculated in SPSS (version 22) using paired t-test and Chi^2.

Results 64 patients were referred to PEPR. 53% (n = 34) decline to attend, 15% (n = 10) failed to complete the programme. Subsequently 31% (n = 20) patients completed PEPR which is comparable to standard PR. Exercise tolerance was significantly improved (difference between the means 46 m 95% CI +/-33 m p = 0.009). QoL was significantly improved (difference between the means 5.4 95% CI +/-3.1 p = 0.002). Table 1 demonstrates the impact of PEPR on healthcare utilisation. Both 30 and 90 day readmissions were significantly reduced. 90 day A&E attendances were significantly reduced. Average LoS following readmission in the group who declined PEPR was 11 days compared to an average LoS following readmission in PEPR group of 1 day. Considering the savings associated with bed days alone and staffing expenses the cost benefit of PEPR was £21309 pa.

Conclusions Results suggest PEPR in a DGH population has a significant impact on QoL and exercise tolerance with reductions in healthcare utilisation and associated cost benefits.

Pulmonary infection: discovery science

S86 THE INFLAMMATORY RESPONSE TO STREPTOCOCCUS PNEUMONIAE IS EXAGGERATED BY THE POLYSACCHARIDE CAPSULE

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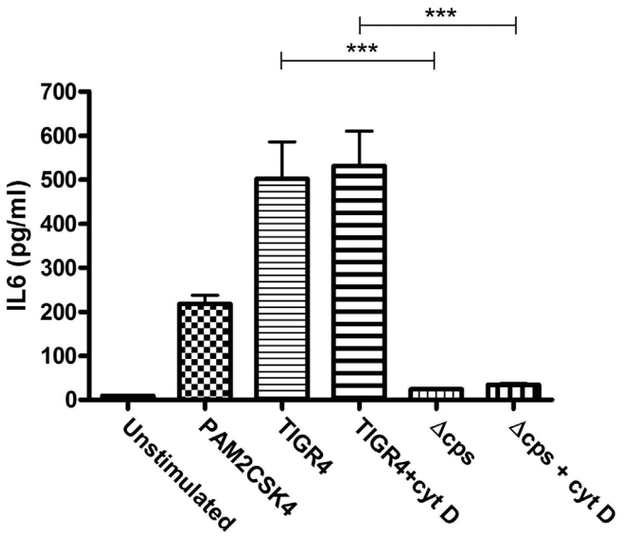
10.1136/thoraxjnl-2014-206260.92

Streptococcus pneumoniae infections characteristically cause a high degree of inflammation. The *S. pneumoniae* polysaccharide capsule prevents opsonophagocytosis and is essential for virulence. The capsule might also be expected to reduce the host's inflammatory response by inhibiting bacterial interactions with pro-inflammatory signalling proteins eg toll-like receptors (TLR), but this has not previously been investigated. Using isogenic unencapsulated strains and *in vitro* and *in vivo* models of infection we have characterised capsule effects on the inflammatory response to *S. pneumoniae*.

Surprisingly, although the unencapsulated (Δ*cps*) *S. pneumoniae* strain was much more sensitive to phagocytosis by macrophages and induced a stronger NFκB response by human monocyte derived macrophages (MDMs) it caused similar levels of stimulation of a TLR2 reporter cell line as the encapsulated strain TIGR4. In addition, microarrays demonstrated increased transcription of pro-inflammatory cytokines by MDMs in response to TIGR4 compared to the Δ*cps* strain, and quantitative PCR and ELISAs confirmed stronger TNF, IL1β, and IL6 responses by MDMs to TIGR4. Furthermore, compared to the Δ*cps* strain the TIGR4 strain caused greater neutrophil recruitment and higher cytokine levels in the lungs in a mouse model of pneumonia, as well as higher serum cytokine levels with worse hypotension in a rat model of sepsis. Additional *in vitro* experiments excluded antibody, complement, pneumolysin, the inflammasome, and lectin-mediated signalling as mechanisms driving differences in inflammatory responses between TIGR4 and Δ*cps*. Expression of the TIGR4 capsule in *Streptococcus mitis* did not increase MDM or murine inflammatory responses. Notably, preventing phagocytosis with cytochalasin D did not alter differences in the inflammatory response between TIGR4 and the Δ*cps* strains, and *in silico* analysis suggested the Δ*cps* strain activated a wider range of transcription factors.



Abstract S86 Figure 1 Monocyte derived macrophages incubated with media or 10μM cytochalasin D for 30 min. Cells washed in PBS, then incubated with bacteria or controls for 6 h. Supernatants assayed for IL6 by ELISA

Overall, the data indicate that unencapsulated *S. pneumoniae* stimulate a wider range of host cell signalling pathways than encapsulated bacteria, some of which are likely to be anti-inflammatory. Hence the capsule, rather than reducing inflammation, causes increased pro-inflammatory responses and subsequent disturbances to host physiology during *S. pneumoniae* infection. Targeting the mechanisms responsible for capsule-dependent inflammation could offer novel treatment options for reducing the morbidity and mortality associated with *S. pneumoniae* infections.

S87 A FUNCTIONAL COMPARISON OF NEONATAL AND ADULT NEUTROPHIL RESPONSES TO RESPIRATORY SYNCYTIAL VIRUS

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10.1136/thoraxjnl-2014-206260.93