Faecal Microbiota Transplantation in the UK

Dr. Robert J Porter,

Consultant in Microbiology and Infection

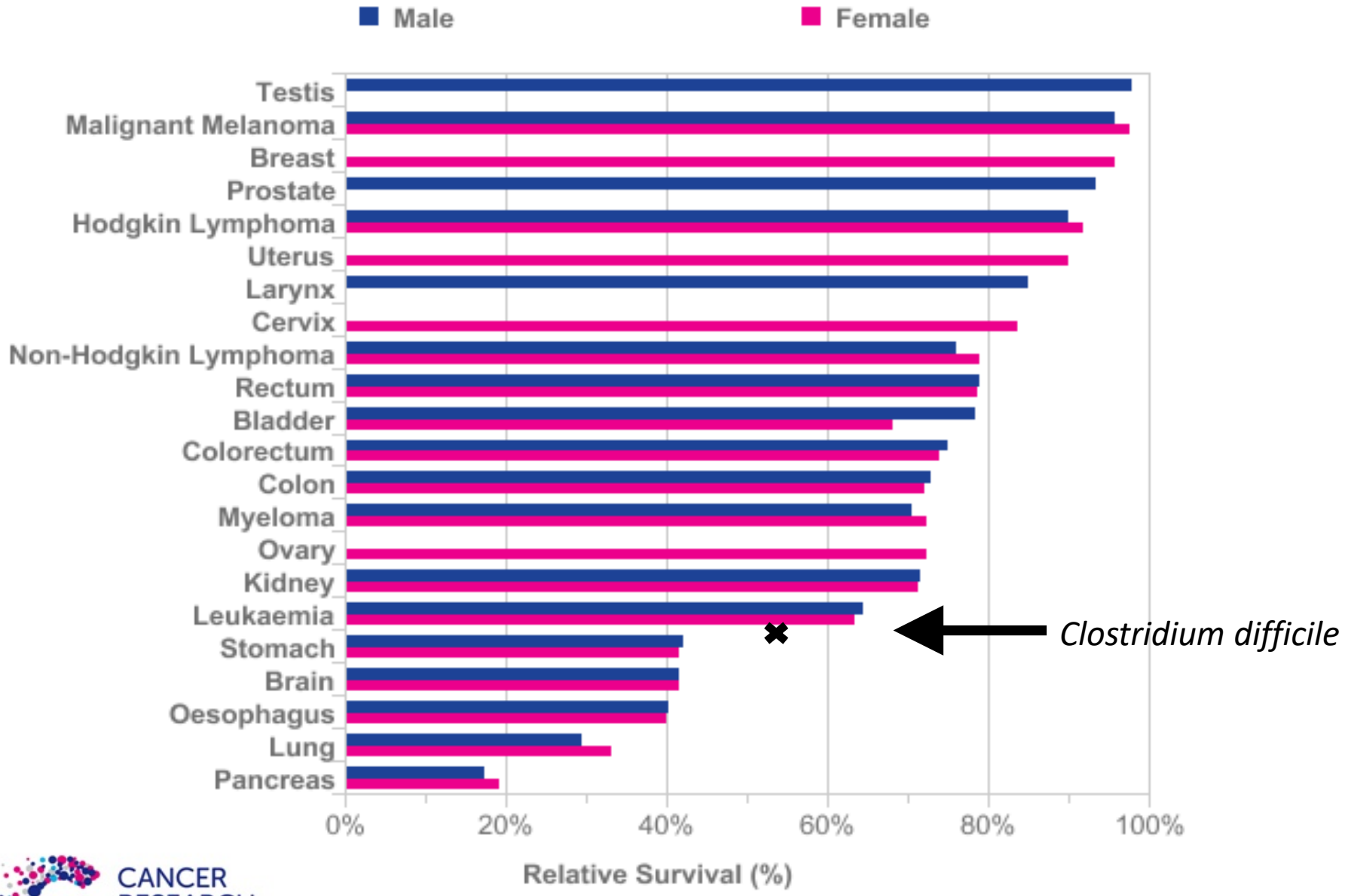
Royal Devon and Exeter Hospital

robert.porter2@nhs.net

Background

21 Common Cancers: Patients Diagnosed 2005 - 2009 and Followed up to 2010

One-Year Relative Survival, Ages 15–99, England



CANCER RESEARCH UK

Prepared by Cancer Research UK

Original data source: ONS Statistical Bulletin (2011) Cancer survival in England- Patients diagnosed 2005-2009 and followed up to 2010

C.diff – local data

Year	Mean age	% female	30 day readmission rate	30 day mortality rate	60 day mortality rate	6 month mortality rate	12 month mortality rate	Mean length of stay
2013	71.3	53.8	34.7	16.0	26.7	38.7	46.7	17.9

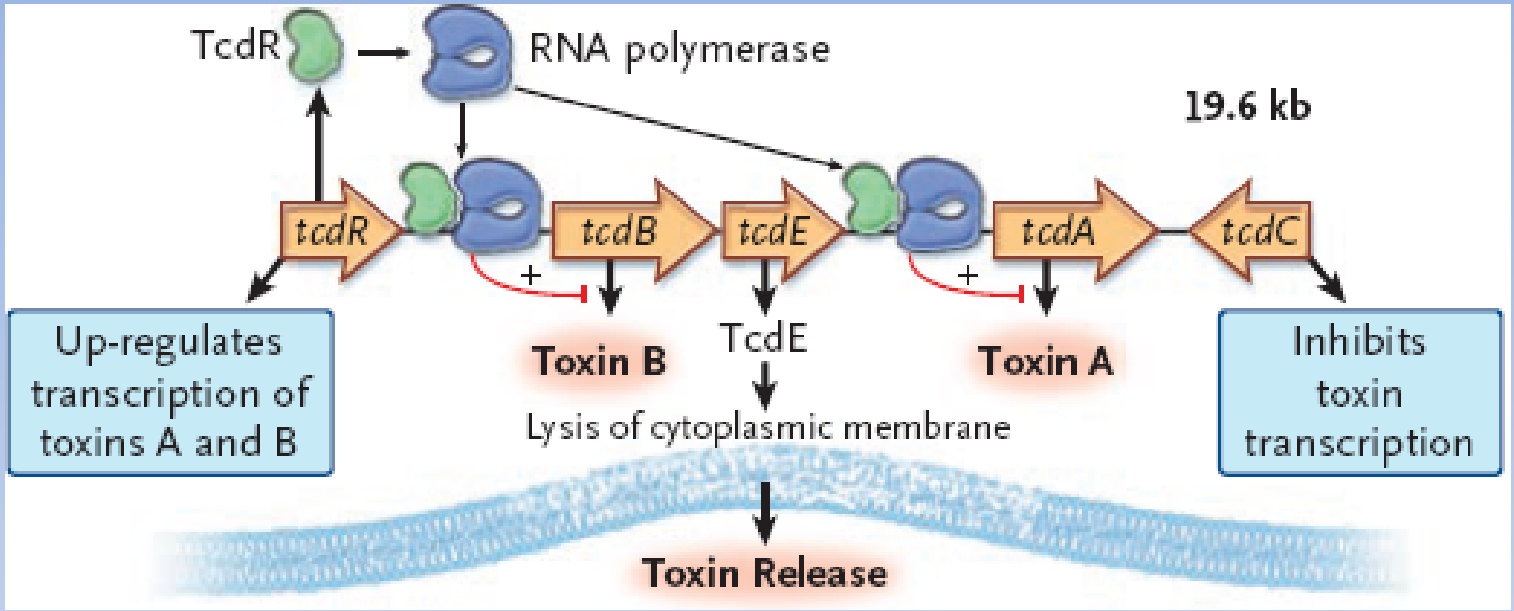
- UK annual mortality for 65-74 age group is 1.5% for women and 2.4% for men
- Estimated cost of a C.diff episode = £9,400
- 2013 excess cost to PHT £752,000
- 40% hospital acquired (>72 hours)
- 61% of community acquired had been discharged from QA in last 30 days
- 18.4% relapse rate *by testing*
- 7.5% re-admitted with positive toxin EIA

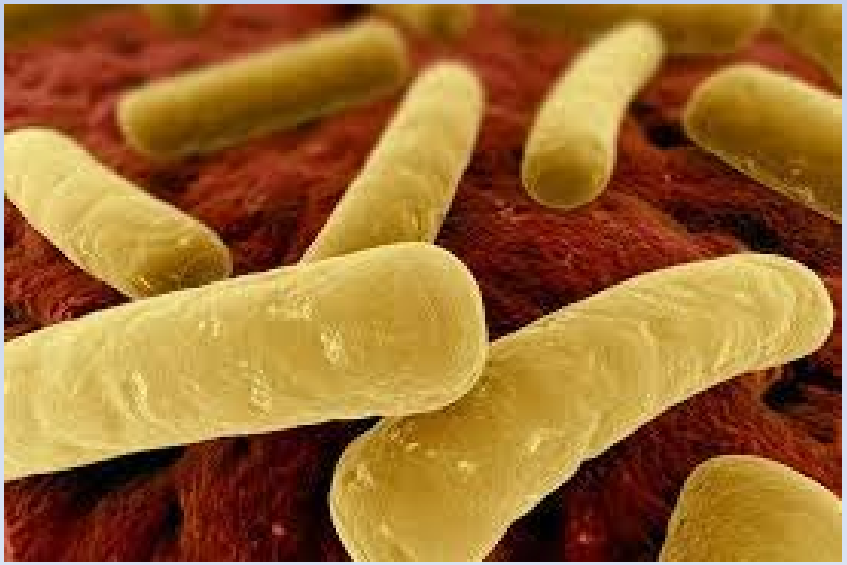
C.diff – national picture

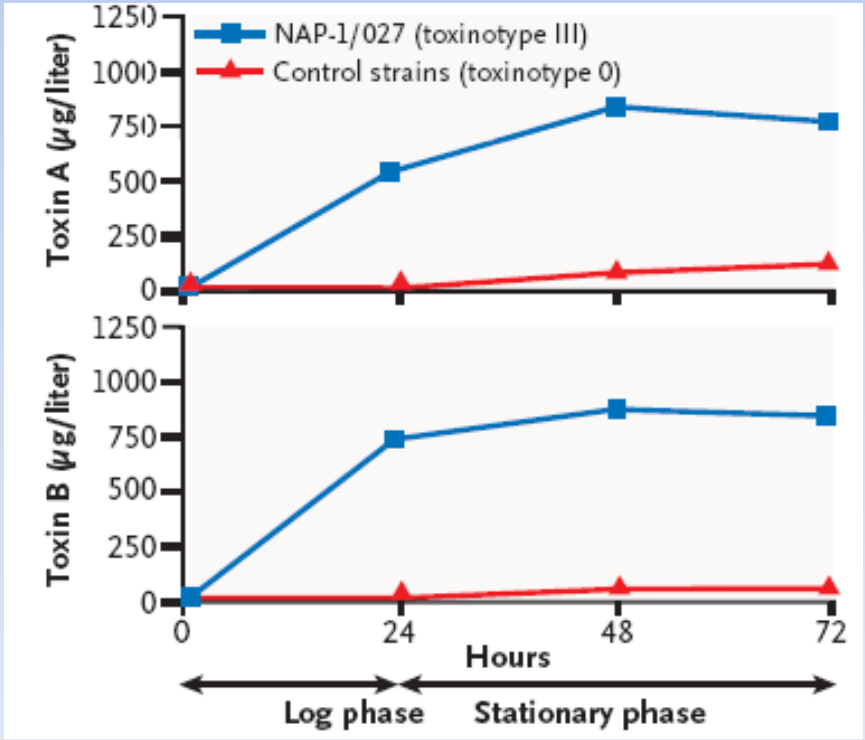
- 10,258 deaths (by Part I) between 2007-11
- Contributing factor in further 12,687
- 1,646 deaths in 2012 accounting for 0.8% of all hospital deaths
- 13,361 cases of *Clostridium difficile* infection (CDI) in England from April 2013-14.

- Stoke Mandeville 2003 -5
- Leicester 2006
- Mid Ulster 2007
- Maidstone and Tunbridge Wells 2007

- Strict targets set nationally for hospital acquired (>72 hours post admission) C.diff infections







N Engl J Med 2008;359:1932-40.


07/04/2015 19:49:35
L
3
131

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Duodenal Infusion of Donor Feces for Recurrent *Clostridium difficile*

Els van Nood, M.D., Anne Vrieze, M.D., Max Nieuwdorp, M.D., Ph.D., Susana Fuentes, Ph.D., Erwin G. Zoetendal, Ph.D., Willem M. de Vos, Ph.D., Caroline E. Visser, M.D., Ph.D., Ed J. Kuijper, M.D., Ph.D., Joep F.W.M. Bartelsman, M.D., Jan G.P. Tijssen, Ph.D., Peter Speelman, M.D., Ph.D., Marcel G.W. Dijkgraaf, Ph.D., and Josbert J. Keller, M.D., Ph.D.

History

- 1958 Denver
  - “re-establish the balance of nature”
  - “immediate and dramatic” response
- 50 years
  - link between *C.diff* infection (CDI) and pseudomembranous colitis
  - antibiotic therapies defined
- Concerning rise in severity and recurrence
  - 1st recurrence 25%
  - 2nd recurrence 35-45%
  - 3rd recurrence >50%

Current trials for FMT on clinicaltrials.gov

C. diff
IBS
UC
Crohn's
Pancreatitis
Metabolic Syndrome
AML therapy
Resistant organisms
Primary Sclerosing Cholangitis
Constipation
NASH
Obesity
Pseudo-obstruction
Post-HSCT
Hepatic encephalopathy
Epilepsy
TIIDM
MRSA
HIV
Hep B chronic liver failure
Pouchitis
Alcoholic hepatitis
NAFLD
Kidney Transplantation
Incontinence
Liver Transplantation
Total Body Irradiation
Chemotherapy
Multiple Myeloma

Faecal microbiota transplant (FMT) for CDI

- Diversity in faecal flora reduced
- Increased numbers of Proteobacteria
- Reduction in Bacteroidetes species and Clostridium clusters IV and XIVa
- Donor flora appears to replace any previous flora

Grehan MJ, Borody TJ, Leis SM, Campbell J, Mitchell H, Wettstein A. Durable alteration of the colonic microbiota by the administration of donor fecal flora. J Clin Gastroenterol **2010**; 44:551–61.

Khoruts A, Dicksved J, Jansson JK, Sadowsky MJ. Changes in the composition of the human fecal microbiome after bacteriotherapy for recurrent *Clostridium difficile*-associated diarrhea. J Clin Gastroenterol **2010**; 44:354–60.

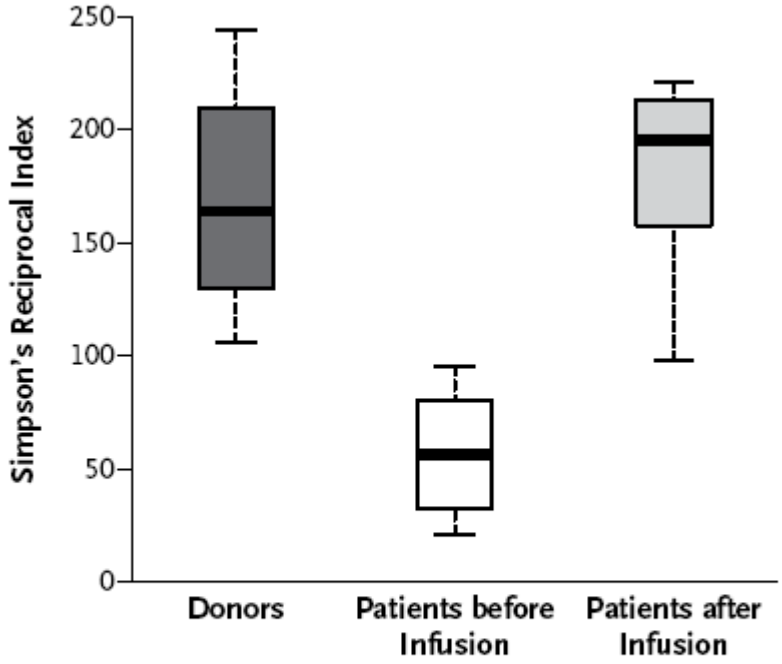


Figure 3. Microbiota Diversity in Patients before and after Infusion of Donor Feces, as Compared with Diversity in Healthy Donors.

Table S2: Bacterial groups that significantly change in relative abundance (%) in microbiota of patients following donor feces infusion. Ten matched pairs of fecal samples from patients before and after donor feces infusion were used for this analysis with fecal samples from their donors (N=9) as reference. Comparisons were done using the Wilcoxon signed-rank test corrected for false discovery rate using the Benjamini & Hochberg approach. Corrected p values<0.05 were considered significant. Bacterial groups at phylum and genus-like levels are included that are present at a relative abundance of >0.5% and >0.05%, respectively.

		Relative abundance (%±SD)			
Phylum	Phylum (Class) / Genus-like	Donor	Before	After	p value
Bacteroidetes	Bacteroidetes	10.56±8.29	5.27±9.04	13.69±14.42	0.04
	Alistipes et rel.	1.15±0.88	0.41±0.87	2.30±2.46	0.03
	Bacteroides intestinalis et rel.	0.47±0.51	0.12±0.36	0.52±0.54	0.03
	Bacteroides ovatus et rel.	0.46±0.37	0.30±0.91	0.91±0.94	0.03
	Bacteroides plebeius et rel.	0.87±0.81	0.20±0.46	0.96±1.02	0.04
	Bacteroides splachnicus et rel.	0.44±0.31	0.32±0.78	0.90±1.14	0.04
	Bacteroides uniformis et rel.	0.64±0.68	0.31±0.73	0.98±1.16	0.04
	Bacteroides vulgatus et rel.	0.93±1.17	0.09±0.25	1.21±1.61	0.02
	Parabacteroides distasonis et rel.	1.00±0.80	0.46±1.28	1.77±2.22	0.04
	Prevotella ruminicola et rel.	0.15±0.09	0.16±0.49	0.34±0.31	0.04
	Prevotella tannerae et rel.	0.83±0.76	0.25±0.74	0.78±0.87	0.03
Firmicutes	Bacilli	2.69±2.71	41.46±27.69	8.11±6.54	0.01
	Aerococcus	0.00±0.00	0.06±0.09	0.01±0.01	0.03
	Granulicatella	0.00±0.00	0.10±0.12	0.02±0.03	0.04
	Streptococcus mitis et rel.	0.75±0.78	8.84±6.72	2.23±2.13	0.04
	Clostridium cluster IV	25.60±10.74	3.43±3.25	14.66±7.19	0.0001
	Anaerotruncus colihominis et rel.	0.20±0.11	0.10±0.24	0.37±0.46	0.04
	Clostridium cellulosi et rel.	0.73±0.42	0.13±0.23	1.01±1.07	0.04
	Clostridium leptum et rel.	0.37±0.27	0.05±0.05	0.59±0.81	0.01
	Faecalibacterium prausnitzii et rel.	13.62±8.68	0.89±2.42	3.44±2.99	0.04
	Oscillospira guillermondii et rel.	3.25±3.47	0.15±0.13	1.95±3.55	0.03
	Ruminococcus bromii et rel.	0.44±0.36	0.07±0.21	0.41±0.42	0.04
	Ruminococcus callidus et rel.	1.72±1.41	0.02±0.03	0.77±1.23	0.02
	Sporobacter termitidis et rel.	0.72±0.53	0.06±0.10	1.10±1.60	0.02
	Subdoligranulum variable et rel.	2.59±1.40	0.26±0.30	3.00±3.66	0.02
	Clostridium cluster XIVa	53.75±14.68	27.97±27.22	54.92±18.46	0.01
	Anaerostipes caccae et rel.	2.59±1.15	1.26±2.96	1.96±1.23	0.04
	Clostridium colinum et rel.	0.42±0.33	0.02±0.02	0.30±0.19	0.02
	Clostridium sphenoides et rel.	2.96±1.73	0.94±0.91	2.45±1.45	0.04
	Eubacterium rectale et rel.	3.49±1.53	0.92±1.52	2.31±1.47	0.04
	Eubacterium ventriosum et rel.	2.10±0.48	0.63±1.43	1.22±0.67	0.04
	Lachnobacillus bovis et rel.	2.16±1.09	0.33±0.53	1.33±0.79	0.03
	Ruminococcus lactaris et rel.	0.84±0.57	0.25±0.42	0.79±0.38	0.04
	Ruminococcus obeum et rel.	9.68±5.13	4.34±6.13	13.40±7.46	0.03
	Uncultured Clostridiales	2.93±3.66	0.02±0.02	1.85±2.26	0.0005
	Uncultured Clostridiales II	0.91±0.84	0.02±0.02	1.00±1.05	0.02
Proteobacteria	*Enterobacter aerogenes* et rel.	0.01±0.01	1.36±2.30	0.01±0.01	0.02
	Klebisiella pneumoniae et rel.	0.00±0.00	0.96±1.26	0.01±0.01	0.02
	Proteus et rel.	0.00±0.00	0.19±0.36	0.00±0.00	0.04
	Vibrio	0.00±0.00	0.06±0.05	0.00±0.00	0.02
	Yersinia et rel.	0.00±0.00	0.27±0.44	0.00±0.01	0.03

FMT evidence

- Numerous case reports
- Systematic review: overall cure of 92% (89% after a single treatment)
- Relapse rate of 4%
- Predictors of good outcome:
  - Related donor (preferably female!)
  - Mix with water (or milk) not saline
  - Avoid preceding vancomycin/PPI or lavage
  - Use large volume >500ml

Clinical Infectious Diseases 2011;53(10):994–1002

FMT evidence

- NEJM 16th Jan 2013
- Open label, randomised controlled trial run in Holland
- Three arms
  - Vancomycin 500mg qds 14 days
  - Vancomycin 500mg qds 4-5 days then bowel lavage and infusion of faecal suspension via nasoduodenal tube
  - Vancomycin 500mg qds 14 days with bowel lavage on day 4 or 5.
- Planned to recruit 40 patients per arm
- Exclusion criteria
  - Recent chemotherapy, HIV with CD4 < 240, prolonged prednisolone >60mg/day
  - Pregnancy
  - Concomitant antibiotic use
  - ITU or vasopressor support required

FMT evidence

- Terminated early following interim efficacy analysis
- 43 patients enrolled (17 in infusion arm, 13 in two other arms)
- Overall cure of 94% (81% after first infusion) for FMT
- 31% cure in vancomycin only arm
- 23% cure in vanc + bowel lavage arm
- $p<0.001$ for overall cure with OR of 3.05 (95% CI 1.08 to 290.05)

FMT yuck factor!

- 73% would have FMT again
- 53% would opt to have it as first line

Fecal Microbiota Transplantation: Patient and Physician Attitudes - CID 2012

- 94% report diarrhoea immediately following infusion
- 31% cramping
- 19% belching
- 19% constipation

Duodenal infusion of donor feces for recurrent *Clostridium difficile* – NEJM 2013

Published data

- 2012 Zipursky, Jonathan Samuel – Patient attitudes US
  - 192 completed surveys
  - 85% would choose FMT first line
  - 94% if physician recommended
- 2013 Jiang, Zhi-Dong – Physician attitudes US
  - 89 completed surveys (36% ID, 62% Gastro)
  - Majority (66%) supported a regional FMT centre
  - 86% would refer to a regional FMT centre
- 2014 Zipursky, Jonathan Samuel – Physician attitudes US
  - 135 completed surveys
  - 35% had treated, offered or referred for FMT
  - 65% had not treated, offered or referred
  - The most common reasons for not offering
    - not having 'the right clinical situation' (33%)
    - patients would find it too unappealing (24%)
    - institutional or logistical barriers (23%)
    - only 8% of physicians predicted that the majority of patients would opt for FMT if given the option

UK data

- Developed a simple 5 minute survey
- E-mail shot via BIS and Royal College of Gastroenterologists
- 162 responses

Specialty	Grade	Number (percent)	Average number of CDI cases consulted on per month				
			0	1-2	3-5	6-10	>10
Infection	Consultant	104 (65)	1 (1)	41 (39)	43 (41)	15 (14)	4 (4)
	Senior trainee	24 (15)	0 (0)	8 (33)	10 (42)	2 (8)	4 (17)
Gastroenterology	Consultant	25 (16)	2 (8)	13 (52)	9 (36)	1 (4)	0 (0)
	Senior trainee	4 (2)	0 (0)	4 (100)	0 (0)	0 (0)	0 (0)
Other		4 (2)	1 (25)	2 (50)	0 (0)	0 (0)	1 (25)

- 1 in 7 infection consultants in the UK (104/746)
- 1 in 2 UK Trusts and Boards represented (86/183)

Porter R, Fogg C. Faecal microbiota transplantation for Clostridium difficile infection in the United Kingdom. Clin Microbiol Infect. 2015; 21: 578-82

UK data
Current therapies in use

Therapy	Number (Percent)
Vancomycin (oral)	160 (99·4)
Metronidazole (oral)	155 (96·3)
Metronidazole (intravenous)	145 (90·1)
Fidaxomicin (oral)	112 (69·6)
Intravenous Immunoglobulin	82 (50·9)
Vancomycin (per rectum)	54 (33·5)
Colectomy	43 (26·7)
Faecal Microbiota Transplant	33 (20·5)
Rifaximin (oral)	27 (16·8)
Cholestyramine	6 (3·7)
Sodium fucidate (oral)	3 (1·9)
Teicoplanin (oral)	2 (1·2)
Nitazoxanide (oral)	1 (0·6)
Bacitracin (oral)	0 (0·0)

- FMT Use
  - 34/161 (21·1%) had used it in the last year
  - 36/161 (22·4%) had used it in the last 10 years
  - Only nine (5·6%) respondents from four unique Trusts or Boards (4·4%) reported performing more than 10 FMTs

UK data
Perceived need

- 130 (94·1%) consulted on patients who would benefit from FMT
- 132/141 (93·6%) would recommend FMT in patients who had recurrent CDI
- Only five (3·5%) would never consider recommending FMT

UK data
Facilitators and barriers

- Respondents were asked to report how 11 different factors influenced their view of FMT

Factor	Favours use (percent)	Inhibits use (percent)	Neither (percent)	Don't know (percent)
Evidence base	**133 (96·4)**	0 (0·0)	2 (1·4)	3 (2·2)
Benefit vs. risk	**128 (90·8)**	1 (0·7)	8 (5·7)	4 (2·8)
Overall cost	**59 (41·8)**	14 (9·9)	42 (29·8)	26 (18·4)
Antimicrobial resistance	**86 (61·0)**	5 (3·5)	41 (29·1)	9 (6·4)
Patient safety	**78 (55·3)**	17 (12·1)	37 (26·2)	9 (6·4)
Patient acceptance	33 (23·4)	**58 (41·1)**	37 (26·2)	13 (9·2)
Donor selection	13 (9·3)	**67 (47·9)**	45 (32·1)	15 (10·7)
Cost to local laboratory	14 (10·0)	46 (32·9)	**64 (45·7)**	16 (11·4)
Availability of prepared stool	47 (33·6)	**66 (47·1)**	16 (11·4)	11 (7·9)
Feasibility and practicality of procedure	35 (24·8)	**81 (57·4)**	19 (13·5)	6 (4·3)
Local expertise	45 (32·1)	**64 (45·7)**	24 (17·1)	7 (5·0)

UK data
Facilitating uptake

- 135/140 (96·4%) would like access to a regional protocol and patient information sheet
- 136 (97·1%) would use pre-screened faecal slurry if it were available regionally
- 131 (93.6%) would like access either on or off-site to a physician experienced in FMT
- 97 (69·3%) would like the ability to refer patients to a regional faecal transplant centre

Building on the evidence

- Quality controlled batched product from individual donors with known microbiota diversity pattern
- Aliquoted with known viable count at point of freezing
- Frozen at -80°C for up to 3 months in 10% glycerol
- Transported overnight in temperature controlled conditions to receiving Trust
- Can then be given via any enteral route deemed clinically/practically appropriate.

Building on the evidence

- £40,000 grant from PHT and WAHSN for a one year pilot frozen FMT bank to serve Wessex
- Providing pre-screened slurry at cost via overnight DX
- Detailed expert support to guide initial use
- Patient registry
- Spin offs: PROMs, donor/recipient data and microbiota, standard morbidity/mortality outcomes, development of artificial poo/individualised therapy, IBD/MDR, allergy

Wessex FMT Bank | WAHSN

Portsmouth Hospitals NHS
NHS Trust

BEATING C.DIFF TOGETHER

University of Portsmouth

Our Story of Faecal Microbiota Transplants (FMTs)

Kelly Bicknell

Clinical Scientist and Technical Lead for Wessex FMT Service

BAPEN 2016 Brighton

09/11/2016

Our story

- **Wessex FMT Service**
  - Fresh service set up in 2013 by Dr Porter
  - 28 patients treated
  - Survey on barriers to FMT uptake
  - Publication of non-inferiority study for Frozen FMT[1]
  - Frozen service funded Wessex AHSN Aim in July 2015
  - 43 patients treated under frozen service
  - Providing a complete FMT service
  - Evaluate an FMT service in clinical practice
  - Improve service based on Evaluation

1 Christine H. Lee et al, 2016

Frozen FMTs

- **Frozen FMTs**
  - Bank of pre-screened stored FMT Aliquots
    - Safety
    - Quality
    - Logistics
  - Shelf life at least 3/12
  - Improves yield (1→30)
  - An RCT published Jan 2016 found no difference in efficacy of Fresh vs Frozen FMT [1]
  - Increase area where FMT can be supplied

1) Christine H. Lee et al, 2016

Our story

- **Wessex FMT Service**

Sourcing and screening healthy donors

Providing Aliquots to other NHS trusts Inter-laboratory transport

Pathway Inpatient admissions for procedure

Documentation

Patient feedback

Patient Information Leaflets

Pre-procedure

Creating frozen FMT Aliquots – dedicated equipment

Patient clinics /referrals

During procedure

Expert advice / case discussion

Ensuring high level of quality, safety and traceability

Information and step-by-step for clinicians

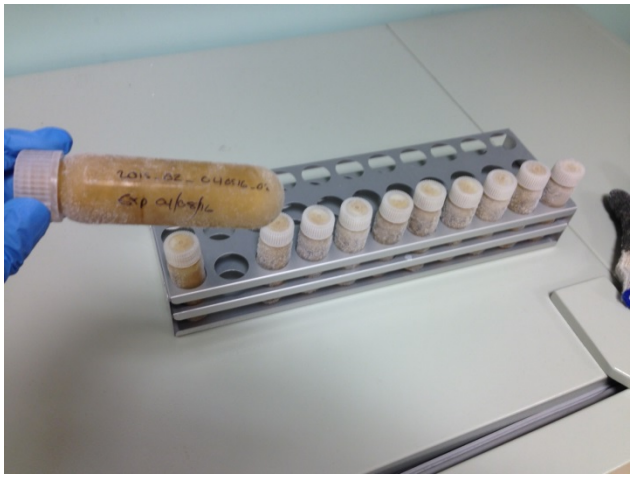
Ward checklists

Post-procedure

Follow up patient outcomes

Discuss indication for Second FMT (if required)

Frozen FMT Service



Frozen FMT Service evaluation

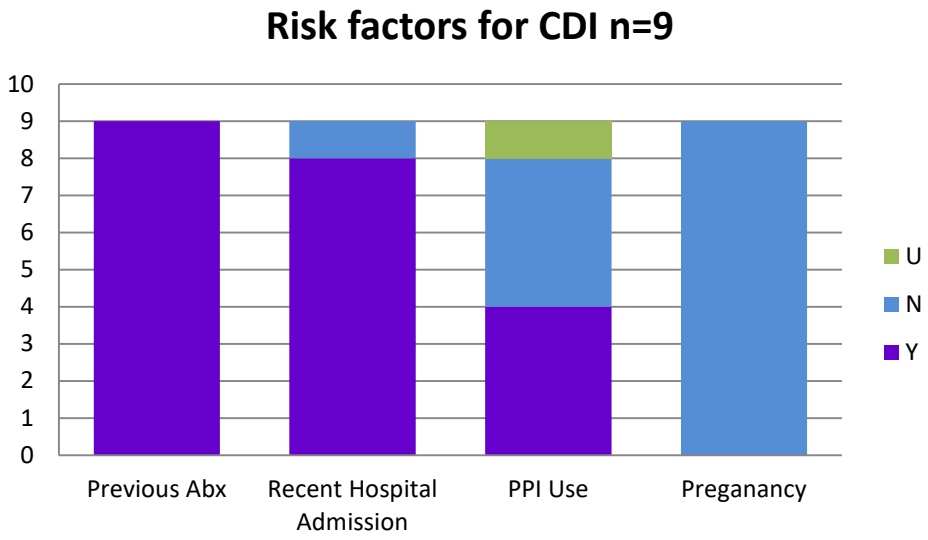
- **Aims**
  - Describe the demographics of patients receiving FMT
  - Determine if clinical outcomes are similar to literature (80% cure after 1 FMT 94% after 2)
  - Evaluate patient's acceptance of FMT
  - Determine if a regional FMT Service is feasible.

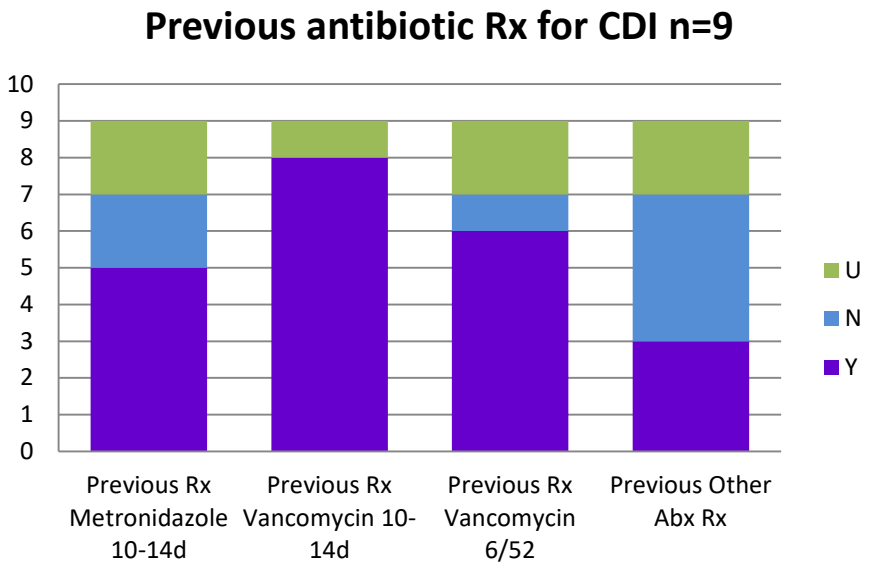
Frozen FMT Service evaluation

- **Methods**
  - Patients treated between 23/07/15 and 23/01/2016
  - Patient baseline information collected
    - *C.difficile* infection, risk factors, and treatments
    - Age, gender, Charlson Comorbidity index, Preprocedure biochemistry/ Haematology
  - Patient follow up at 1/52, 6/52, and 6/12
  - Clinical outcomes
    - Resolution of symptoms
    - Mortality
  - Patient satisfaction surveys
    - Focus group: Information, Quality of admission, Laxative, NJ, Staff awareness and staff IPC compliance
  - Quality of life (QoL) surveys - *2009 EuroQol Group EQ-5D*
    - Mobility, pain, anxiety, self care, usual activity, objective score

Frozen FMT Service evaluation

- **Results – *C.difficile* infections**
  - 12 patients treated in first 6/12 (43 in 15 months)
    - 9 patients for chronic recurrent CDI
    - 3 other indications (refractory CDI / CD colitis / presumed chronic recurrent CDI)
  - 5 at PHT, 4 within other trusts.
  - Time between initial diagnosis and FMT: 163 days (Range 46 – 396)
  - Toxin B PCR + (100%), Toxin A/B EIA + (7/9)
  - No dominant Ribotype

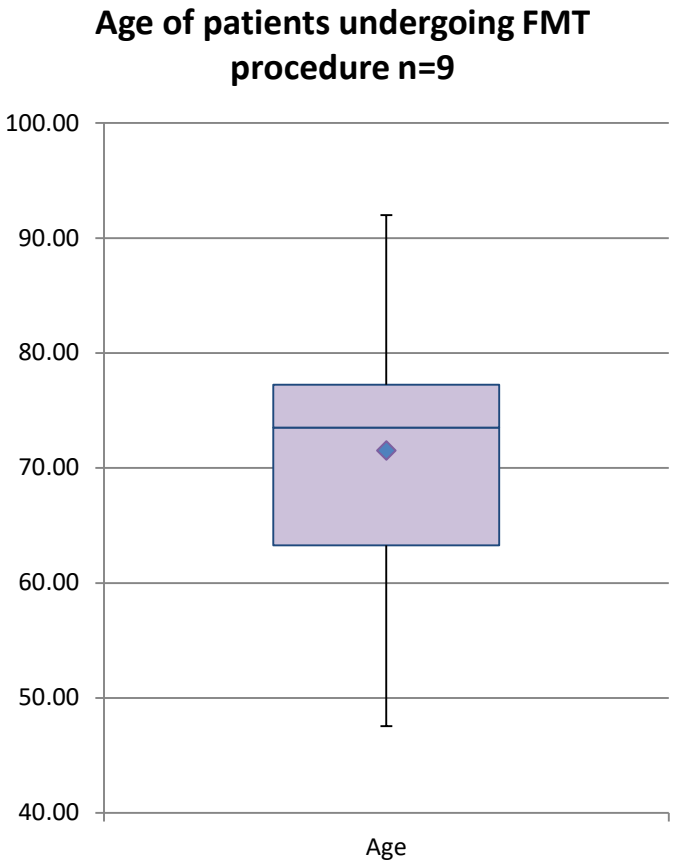




Frozen FMT Service evaluation

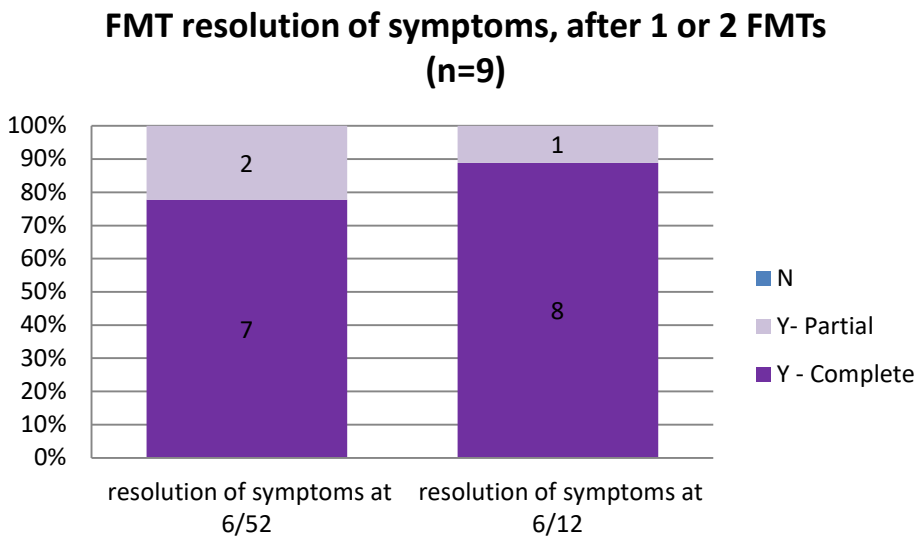
- **Results - Demographics of patients receiving FMT**

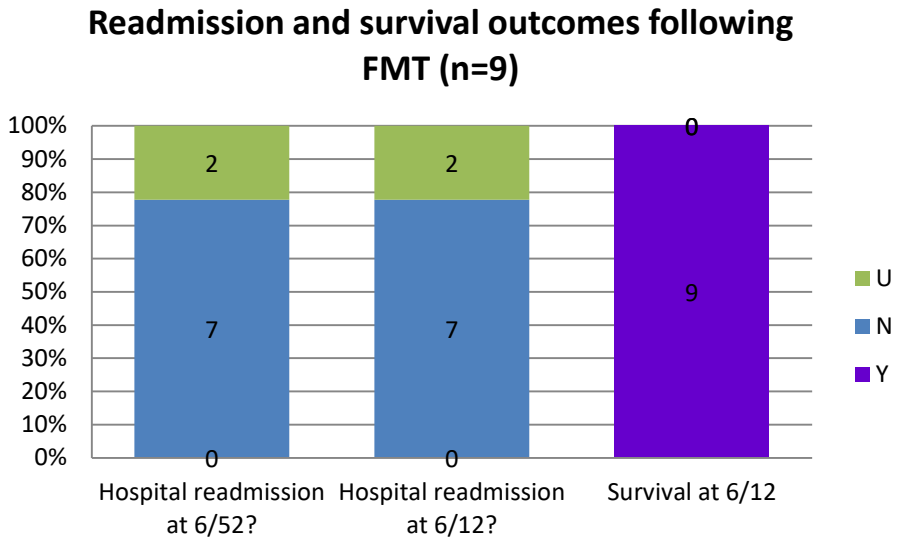
Patient Demographics	Mean
Age (years)	71.51 SD: 14.79
Gender F:M	6:3
Charlson co-morbidity index	4.22 SD: 2.54 (Range 0-6)
White cell count (x10^9/L)	7.38 SD: 3.72 (Range 3.40 – 15.70)
Albumin (g/L)	33.44 SD 7.26 (Range 18 – 40)
Pre-procedure eGFR	63.11 SD 25.33 (Range 19 – 90)
Pre-procedure CRP	7.0 (median) IQR (3-17)



Frozen FMT Service evaluation

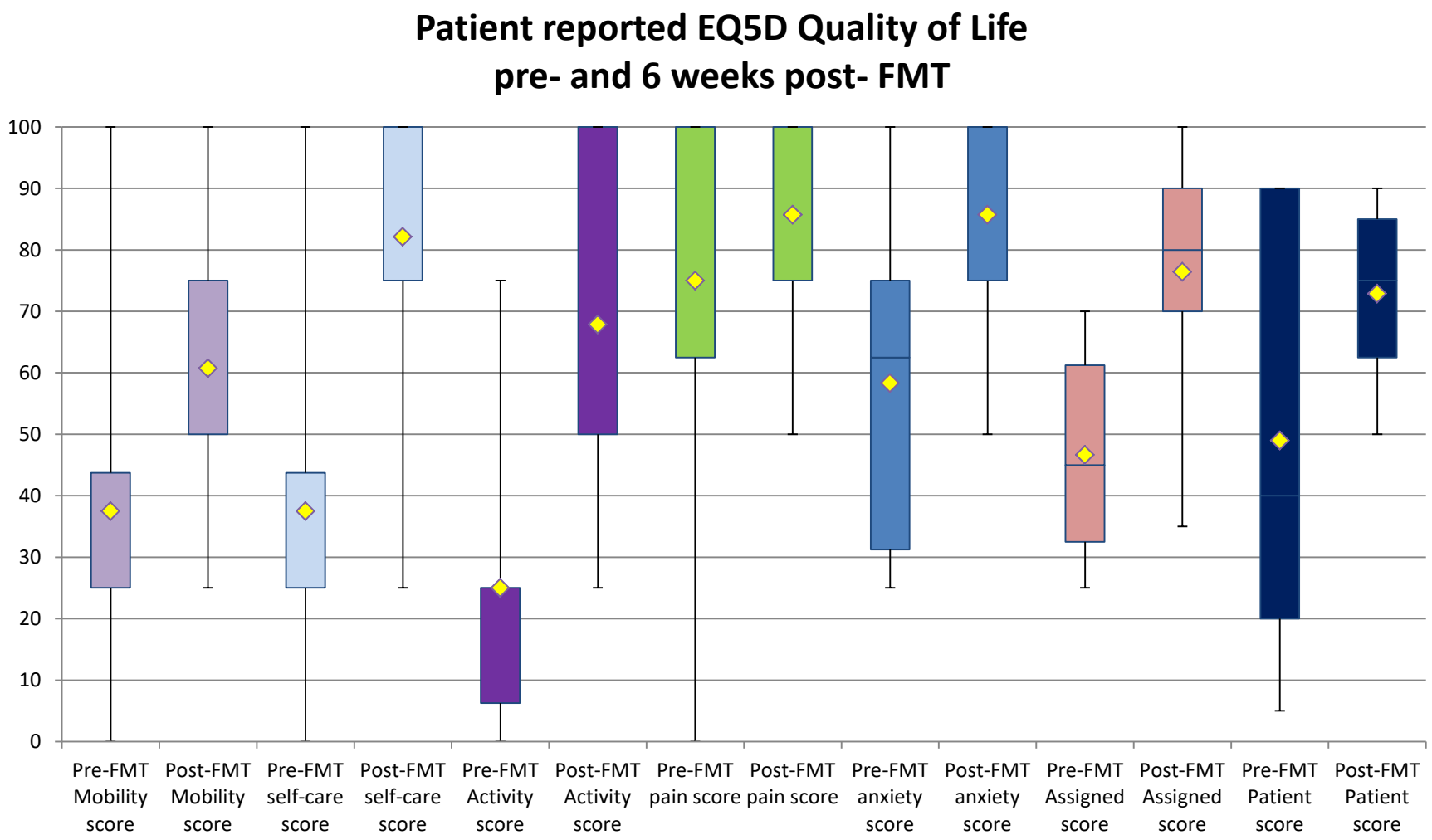
- **Results - clinical outcomes**
  - All procedures completed successful, no immediate complications
  - 100% of patients saw at least partial improvement of symptoms
  - 42/43 (97.7%) complete resolution of Sx after 1 or 2 FMTs
  - 22% second FMT performed
  - No known re-admissions for CDI – No patients on Abx for CDI
  - 100% survival at 6/12





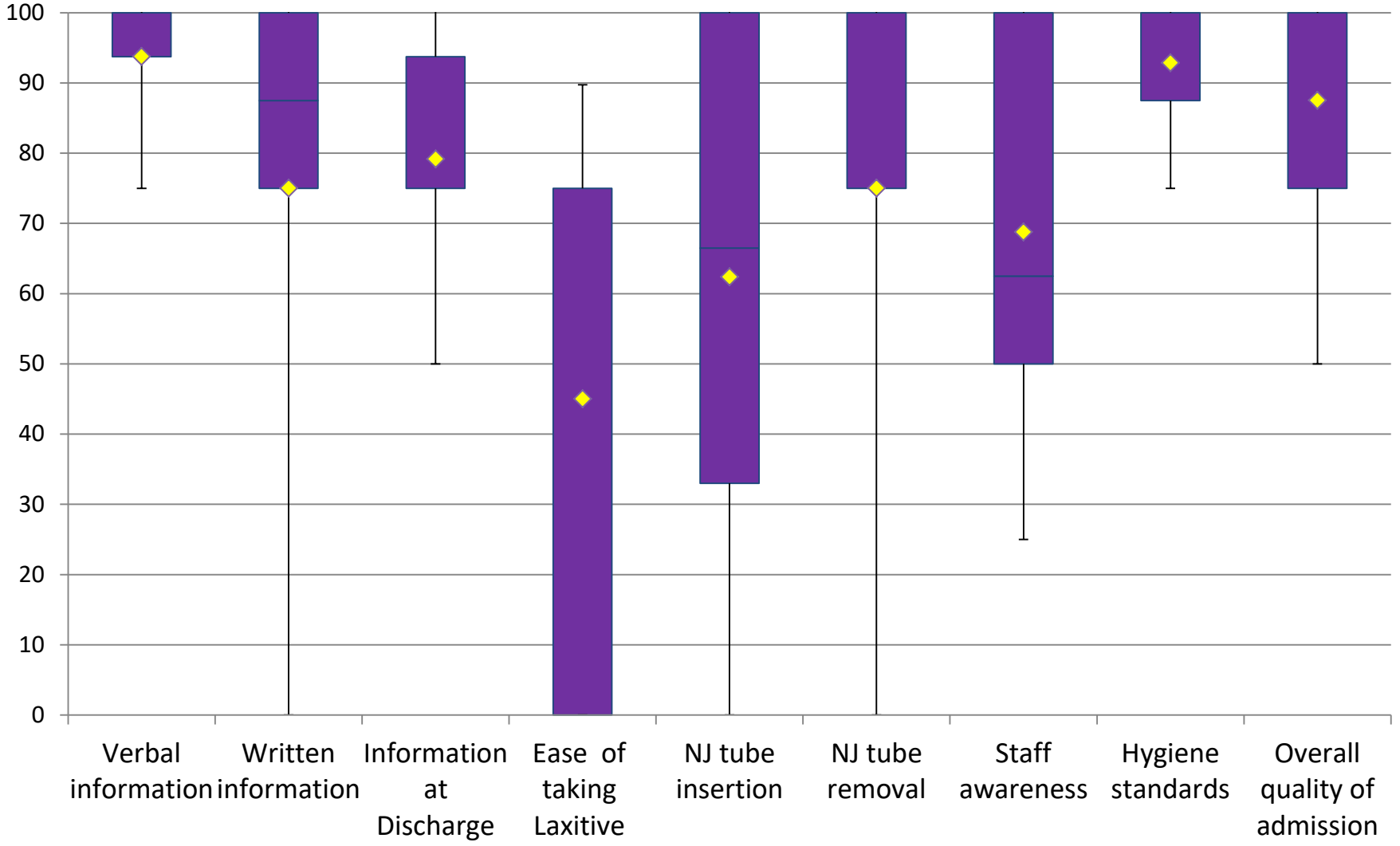
Frozen FMT Service evaluation

- **Results - Patient's outcomes**



Frozen FMT Service evaluation

- **Results - Patient's Feedback 1/52 post- FMT**



Frozen FMT Service evaluation

- **Results - Patient's Feedback following FMT**

  - *"Before the procedure I had a large burden of anxiety about the ongoing diarrhoea and I could not even do my cooking. Now (after the faecal transplant) the diarrhoea has gone and I am so happy."*
    Patient

  - *"The diarrhoea was taking a huge psychological toll on my father and it meant he could not visit his wife in her care home. Since the diarrhoea resolved, as a result of the faecal transplant, he has been able to visit her. I believe that were it not for the procedure, he would no longer be with us."*
    Patient family member

Frozen FMT Service Raising awareness

The News

NEWS | HEALTH | CRIME | POLITICS | TRAVEL | EDUCATION | DEFENCE

Human faeces used in gut infection treatment

the cure made in your bowels

Tom Whipple Science Editor

It's a miracle cure for a terrible disease, its supply is unlimited and it's very, very cheap. There is only one catch: the medicine is human faeces and you have to ingest it.

The first frozen faecal bank has opened in a British hospital after the NHS conceded that, however unpalatable it may sound, the advantages of swallowing other people's stools can vastly outweigh the understandable squeamishness people feel about it.

ity to know when they will open their bowels and is often unable to leave their house. It is difficult to pin deaths directly to the disease because patients often die of other conditions already present, but it greatly exacerbates illness."

The US Centers for Disease Control and Prevention estimate that 10 per cent of over-65s die within a month of diagnosis.

Private clinics already offer treatments and at some hospitals the procedure, which involves ingesting about 50ml of faeces, has become almost stan-

Before he installed the faecal transplant bank Dr Porter delivered all samples "fresh". He said: "It had to be donor-to-patient within six hours. I'd stick the faecal transplant in the car and hope I didn't have an accident."

itv | Live TV | Shows | Categories | News

NEWS | Top stories | Your area | Topics | Sport | Weather

ITV REPORT 19 May 2016 at 11:16am

Frozen human faeces bank could provide cure for C. diff infection

Human waste used to cure dangerous gut disease

Share on

HUFFPOST LIFESTYLE
UNITED KINGDOM

Edition: UK | Search The Huffington Post

FRONT PAGE | NEWS | POLITICS | LIFESTYLE | PARENTS | TECH | YOUNG VOICES | COMEDY | ENTERTAINMENT | STYLE

LIFESTYLE

NHS Opens Frozen Human Faeces Bank To 'Save Lives' From Disease

Frozen FMT Service Engagement

Sites performing FMT using Wessex Frozen FMT service:

- Chichester
- Southampton
- Isle of Wight
- Bournemouth
- Winchester
- Basingstoke
- Dorchester
- Jersey
- Hereford
- Exeter

Patient referrals:

- Watford GP
- Portsmouth CCGs

Clinician Enquiries:

- Stoke Mandeville Hospital
- Poole Hospital

Patient enquiries:

- Manchester

Service Development

- **Improvements**
  - Optimised written information with patient focus group
  - Single location for the procedure (specific ward)
  - Nutrition nurses perform NJ insertion
  - Education of involved staff
- **Other considerations**
  - Tighter control of donors
  - Long term effects not yet established - Risk benefit in younger patients?
  - Role of laxatives?
  - Matched donors???

Service Future prospects

- **Short term**
  - Implement further improvements
    - FMT as Day case procedure (where possible)
    - MHRA Licence – rubber stamp quality and safety
  - Increase number of eligible patients receiving the treatment
    - Patients feedback V. positive
    - Large number of eligible patients not being considered for FMT
    - Improved access to treatment
    - Raise awareness
  - Reduce burden of CDI on patient and wider health economy
  - Collaborate on clinical trials for CDI and other applications
- **Longer term**
  - Describe the Microbiome – “normal” and “disease” states
  - Personalised medicine with “Off the shelf” bacterial treatments
  - Alternative applications of FMT

Wessex FMT Bank | WAHSN Portsmouth Hospitals NHS

BEATING C.DIFF TOGETHER

University of Portsmouth

Questions?

Many Thanks

Dave Meehan and Wessex AHSN
Dr Robert Porter
Dr Andrew Flatt
Carole Fogg
Catharine Cameron
FMT Donors
FMT Patients

All of the Microbiology Department at PHT

Microbiologists and Gastroenterologists at:
St. Richards Hospital, Chichester
Southampton General Hospital
Isle of Wight Hospital
Royal Bournemouth and Poole Hospitals
Hampshire Hospitals
Dorchester Hospital
Jersey General Hospital
Royal Devon and Exeter
Hereford