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Outcomes of an Innovative Outpatient Monitor Service for Gynaecological Patients

The Case Study of the Royal Free Hospital

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1. Background

In 2015 and 2016 around 7.5m NHS outpatient appointments were missed in England (6.6% of the total 113m).[1] When examining all treatment specialties, the ratio of non-attendances to attendances was around eight DNAs (did-not-attend) for every 100. Missed appointments can lead to worse care for patients, inefficient use of staff and increased waiting times. While it is difficult to establish the exact financial cost of missed appointments, an estimate by the National Audit Office in 2014 suggests that missed first outpatient appointments cost the NHS up to £225m between 2012 and 2013.[2] Hospitals often put in place coping measures, such as overbooking, but these can introduce further problems, and are not a sustainable solution.

One reason that patients may miss their appointment is simply that they forget. By making the appointment system fit into patients' lives more easily, the NHS hopes to promote attendance, reduce cancelations and rescheduling of appointments to protect much needed NHS resources. There is evidence that telephone or text message reminders substantially reduce the number of DNAs, and that the content of appointment reminders can affect missed appointment rates.[3] Doctors are also making the most of mobile and internet technology to connect with patients. Outpatient consultations via Skype are becoming increasingly common for patients who do not need a physical examination. Telecare and Telehealth services are also expanding, meaning that patients can monitor their health at home and access medical advice without regular visits to their surgery.

2. The Outpatient Monitor Service (OMS)

Message Dynamics has a well-established Telecare system that uses simple voice and text messages to patients to enhance treatment adherence. It is an Outpatient Monitor Service (OMS), supported by two separate elements: an automated telephone follows up call using interactive voice response and a smartphone survey. This system has been well received in the NHS and is currently extending beyond its initial pilot evaluation and into mainstream adoption. The rationale behind the OMS is to use tailored patient feedback to monitor patients' conditions remotely and to inform the decision as to whether a physical outpatient appointment is likely to be required.

This project was initiated in collaboration with the Gynaecology Department at the Royal Free Hospital, which was struggling to implement an aspirational reduction in the percentage of outpatient appointments that were follow-ups rather than new patients. When the project started, 70% of outpatient appointments were represented by follow-ups, compared with the Trust target of 50%. Many of these follow-ups were post-operative or post treatment with the intention of monitoring the response to treatment. However, given that the majority of these patients do not

[1] *Quarterly Hospital Activity Data (2016)* https://www.england.nhs.uk/statistics/statistical-work-areas/hospital-activity/quarterly-hospital-activity
[2] *NHS waiting times for elective care in England (2014)*) https://www.nao.org.uk/report/nhs-waiting-times-elective-care-england-2
[3] *Gurol-Urganci I, de Jongh T, Vodopivec-Jamsek V, Atun R, and Car J.* (2013) *Mobile phone messaging reminders for attendance at healthcare appointments.* Cochrane Database Syst Rev 2013:12: CD007458; *Department of Health (2016) A Zero Cost Way to Reduce Missed Hospital Appointments* https://www.gov.uk/government/publications/reducing-missed-hospital-appointments-using-text-messages/a-zero-cost-way-to-reduce-missed-hospital-appointments#fn:1

experience post-treatment problems, there is a potential opportunity to substantially reduce this workload, provided an effective and responsive system is in place to identify the patients who do require further consultation.

The OMS allows the discharging clinician to specify a bespoke remote follow-up schedule, depending on the individual clinical situation. The patient is contacted by telephone, and asked a series of pre-determined questions. Based on the responses to these questions and the disease-specific protocol, the system will identify the category into which the patient falls. For most, there will be no need for face-to-face clinician contact and a further routine call will be scheduled accordingly. Where problems are identified, the patient can be fast-tracked into an outpatient follow-up appointment or directed to their GP, according to the nature of the problem.

The intention is to reduce the unnecessary attendance at outpatients, while simultaneously increasing the availability of appointments for new patients and necessary follow-ups. Whilst this has obvious merits from the perspective of patients' experience, it also offers potential financial advantages to the Royal Free Hospital Trust.

3. Overall project objectives

This study explored the impact of the OMS on clinical and economic outcomes compared with standard care (i.e. historical patients who did not have access to the OMS). The evaluation focused on three gynaecological procedures at Gynaecology Department at the Royal Free Hospital, including gynaecology intervention (i.e. definitive interventions leading to discharge back to the patient's GP); hysteroscopy; and ongoing treatment of vulval disease.

The objectives of the projects were:

- To identify if the OMS reduces the number of follow-up appointments and if so, by how much. In addition, the evaluation assessed the impact of the MS on DNA rates.
- To identify if the OMS reduces the costs for follow-up visits and missed appointments.

Clinical and economic outcomes data were triangulated with patient perception and satisfaction data to collaborate trends in results and assess whether reduced numbers of (i) follow-up appointments (ii) DNA rates and (iii) costs were accompanied by patient perception of, and satisfaction with, the OMS.

Specific research questions for the three groups of interest are reported in **tables 1-3.**

Table 1: Gynae group: research questions, data sourced, timeframe and analyses applied

	Clinical effectiveness	**Economic impact**
Outcome 1 - Follow up visits	**Number of follow-up appointments**	**Cost of follow-up appointments**
Research question 1	Whether the number of follow-up appointments would be reduced after the introduction of the OMS	Whether the cost of follow-up appointments (NHS visit costs) would be reduced after the introduction of the OMS
Type of data needed	Patient level data on the number of follow-up appointments for OMS and Historical cohorts.	Unit cost data for follow-up visit
Source of data	Hospital data: data available from Royal Free patient administration system. Intervention data: data available from Royal Free patient administration system and from message dynamic database OMS.	NHS tariff
Time frame	6 month longitudinal data collection OMS: 13/07/16 to 13-01-2017; H: 30/06/2015 to 30/06/2016	
Analysis	Mean difference in number of follow-up appointments per patient between OMS and Historical cohorts	Difference in mean costs between OMS and Historical cohorts
Outcome 2 - DNAs	**Rate of patients with DNAs**	**Cost of DNAs**
Research question 2	Whether the rate of DNAs would be reduced after the OMS	Whether the cost of DNAs (NHS visits costs) would be reduced after the introduction of the OMS
Type of data needed	Patient level data on the number of DNAs for OMS and Historical cohorts	Unit cost data for DNAs
Source of data	Hospital data: data available from Royal Free patient administration system. Intervention data: data available from Royal Free patient administration system and from message dynamic database OMS.	NHS tariff
Time frame	6 month longitudinal data collection	

	OM: 13/07/16 to 13/01/17; H: 01/01/2016 to 30/06/2016	
Analysis	Difference in the rate of patients with DNAs (including cancelled and rescheduled) between OMS and Historical cohorts.	Difference in mean cost between OMS and Historical cohorts

Table 2: Vulval group: research questions, data sourced, timeframe and analyses applied

	Clinical effectiveness	**Economic impact**
Outcome 1 Follow up visits	**Elapsed time between successive follow-up appointments**	**Costs of follow up appointments**
Research question 1	Whether the elapsed time between successive follow-up appointments would be increased after the introduction of OMS	Whether the cost of follow-up appointments (NHS visit costs) would be reduced after the introduction of the OMS
Source of data	Hospital data: data available from Royal Free patient administration system. Intervention data: data available from Royal Free patient administration system and from message dynamic database OMS.	NHS tariff
Time frame	6 month longitudinal data collection OM: 13/07/16 to 13-01-2017; H: 01/01/2016 to 30/06/2016	See before
Analysis	Difference in elapsed time between successive follow-up appointment of patients between OMS and Historical cohorts.	Difference in NHS visit costs between OMS and Historical cohorts
Outcome 2 - DNAs	**Rate of patients with DNAs**	**Cost of DNAs**
Research question 2	Whether the rate of DNAs would be reduced after the introduction of the OMS	Whether the cost of DNAs (NHS visits costs) would be reduced after the introduction of the OMS
Source of data	Hospital data: data available from Royal Free patient administration system.	NHS tariff

	Intervention data: data available from Royal Free patient administration system and from message dynamic database OMS.	
Time frame	6 month longitudinal data collection OM: 13/07/16 to 13/01/17; H: 30/06/2015 to 30/06/2016	
Analysis	Difference in the rate of patients with DNAs (including cancelled and rescheduled) between OMS and Historical cohorts.	Difference in mean costs of DNAs between OMS and Historical cohorts

Table 3: Hysteroscopy group: research questions, data sourced, timeframe and analyses applied

	Clinical effectiveness	**Economic impact**
Outcome 1 – Patient safety and service improvement	**Rate of patients who received the result letter***	n/a
Research question 2	Whether the rate of patients who received the letter with the test results increased after the introduction of the OMS	n/a
Type of data needed	Patient level data on the number who received the letter in OM and H cohorts	n/a
Source of data	Hospital data: data available from Royal Free patient administration system. Intervention data: data available from Royal Free patient administration system and from message dynamic database OMS.	n/a
Time frame	6 month longitudinal data collection. OMS: 13/07/16 to 13/01/17; H: 30/06/2015 to 30/06/2016	n/a
Analysis	Difference in the rate of patients with missed histology result in OMS and Historical cohort	n/a

*Note that the hospital sent the test results as per procedure or by some other route (e.g. in the Historical cohort because the patients themselves asked or because they were seen at a subsequent appointment and in the OMS cohort because the hospital acted on a "I have not received my results" re

4. Patients, data collection, data sets and NHS approvals

This is a historical cohort study comparing two separate groups. One group received the OMS, whilst the other was a matched control group from historical patients, seen 12 months prior to the operation of OMS (historical cohort, receiving usual care). Eligible participants were women over 18 years of age who received relevant gynaecological procedures at the Royal Free Hospital between the periods indicated in **tables 1-3.** For both OMS and historical cohorts, patients were grouped according to three separate categories: gynaecology, hysteroscopy or ongoing treatment of vulval disease.

- The **gynaecology** group covered definitive interventions leading to discharge back to the patient's GP.

- **Hysteroscopy** is a particular type of definitive intervention, grouped together with the other definitive interventions to create a specific cohort of patients that can be offered the OMS. The OMS was used to monitor the recovery of patients in this cohort and identify if and when these patients need a follow up appointment.

- Unlike definitive interventions, the **treatment of vulval disease** takes an unspecified period of time that may require multiple interventions. For these patients, the OMS will be used to identify when they need to be seen to receive a further assessment or treatment. Therefore, data related to these patients will need to be analyzed separately from the data related to patients receiving a definitive intervention.

The way the data was compared and analysed varied between the three groups. For example, for patients receiving a definitive intervention the analysis compared the number of outpatient appointments in the OMS and Historical cohorts to quantify any change. However, with vulval patients this number on its own could be misleading, as this is an ongoing treatment. Therefore, we measured also the elapsed time between successive appointments in the OMS and Historical cohorts of patients undergoing vulval treatment and quantified any change. Details on the samples, sample sizes, and comparators for the three groups are presented in **table 4**.

The data collected by the Royal Free included a unique identifier for each patient, the type of treatment they underwent, the date of the intervention and date(s) of any follow up appointment(s). If a patient did not attend any follow up this was recorded. Message Dynamics secured necessary NHS approvals to anonymise this data for secure transmission to LSEE. For more details on the methodology applied please refer to Message Dynamics.

Table 4: Intervention, control and inclusion/exclusion criteria for the three separate groups

	Gynae group	Vulval group	Hysteroscopy group
Intervention	OMS	OMS	OMS
Control	Matching cohort of historic patients who were given a definitive treatment/intervention which could lead to discharge back to GP	Matching Historical cohort of patients who were given a follow up appointment to monitor the symptoms and response to treatment	Matching Historical cohort of hysteroscopy patients with specimen who were discharged awaiting histology result letter
Inclusion criteria	New and follow-up patients attending outpatient clinics given a definitive intervention/ treatment which can lead to discharge back to GP	New and follow-up patients attending outpatient clinic given a definitive intervention/ treatment with the aim of monitoring symptoms and response to treatment	Patients attending outpatient clinic for hysteroscopy and day surgery unit for GA hysteroscopy
Exclusion criteria	Patients with clinical need requiring more frequent follow up and cannot be discharged back to GP. This includes patients sent for diagnostics, added to theatre waiting list, referred to other clinician for treatment etc	Patients with a clinical need requiring more frequent follow up	Patients with a clinical need that needs to be followed up in gynae outpatient clinic and target patient in whom cancer is suspected.

5. Outcomes and analyses

After discussion with the clinical team of the Gynaecological Department at the Royal Free Hospital a series of outcomes was included to ensure our analyses included outcomes that collectively reflected the target priorities of the Royal Free Hospital Trust. Full definitions of each outcome and analyses are provided in tables 1-3. In summary, the outcomes included were:

Gynae and Vulval groups

1. Follow up visits
    - Number of follow-up appointments
    - Costs of follow up appointments
2. DNAs
    - Rate of patients with DNAs
    - Cost of DNAs

Vulval groups

1. Follow up visits
    - Elapsed time between successive follow-up appointments
    - Costs of follow up appointments
2. DNAs

- Rate of patients with DNAs
- Cost of DNAs

Hysteroscopy group

1. Patient safety and service improvement
    - Rate of patients who received the letter with the test results.

A cost consequences analysis was performed across the three groups, where a change in both clinical and economic outcomes was calculated between the OMS and Historical cohorts.

For the economic data (cost of follow up visits and DNAs) each entry was assigned a unit cost based on NHS tariff (see **Appendix 1**). A total cost for each patient was calculated as the sum of costs across all entries during the period. Full details on the outcomes and analyses performed across the three groups are provided in **tables 1-3**.

The costing of the OMS system was based on a weekly snapshot of the number of patients enrolled in the OMS cohorts. After discussion with the expert the unit cost of delivering OMS was assumed to be of the order of £5 per patient. A series of sensitivity analyses were performed to test the robustness of the assumption. Different scenarios were considered from a range between 0 (no added costs) to £10. Details are presented in **Appendix 1**.

6. Headline findings

6.1.1. *Number of participating patients*

Overall sample sizes for the OMS and Historical cohorts is summarised below (see table 5).

Table 5: Overall sample sizes for the OMS and Historical cohorts across the three separate groups

	Gynae group	Vulval group	Hysteroscopy group
Intervention (receiving OMS)	47	48	72
Control (historical cohort)	82 Matching cohort of Historical patients who were given a definitive treatment/intervention which could lead to discharge back to GP	65 Matching Historical cohort of patients who were given a follow up appointment to monitor the symptoms and response to treatment	144 Matching Historical cohort of hysteroscopy patients with specimen who were discharged awaiting histology result letter

More details on the patient characteristics are in appendices 2-4.

6.1.2. *Clinical and economic outcomes*

Full details of the results are presented in appendices 2(Gynae group), 3 (Vulval group) and 4 (Hysteroscopy group). The key findings are summarised below.

Gynae group reported positive results for all outcomes

1. Follow up visits.
   - The number of follow-up appointments was reduced in OMS, compared with the Historical cohort
   - The cost of follow up appointments was reduced in OMS, compared with the Historical cohort
2. DNAs
   - The rate of patients with DNAs was reduced in OMS, compared with the Historical cohort
   - Cost of DNAs was reduced in OMS, compared with the Historical cohort

The economic savings for the NHS were confirmed regardless of the cost of OMS delivery considered (£0 to £10).

Vulval group reported cost savings in OMS (compared with the Historical cohort), whereas there was no difference in elapsed time between the two cohorts.

1. Follow up visits
   - The difference in elapsed time (between successive follow-up appointments) between the two cohorts is not statistically significant at 0.05 level.
   - The cost of follow up appointments was reduced in OMS, compared with the Historical cohort (regardless of the cost of OMS delivery considered)
2. DNAs
   - The small sample size could not allow to test for difference in rate of patients with DNAs between the two cohorts
   - Cost of DNAs was reduced in OMS, compared with the Historical cohort (regardless of the cost of OMS delivery considered)

The economic savings for the NHS were confirmed regardless of the cost of OMS delivery considered (£0 to £10).

Hysteroscopy group reported positive results

1. Patient safety and service improvement
   - Rate of patients who received the letter with the test results was increased.

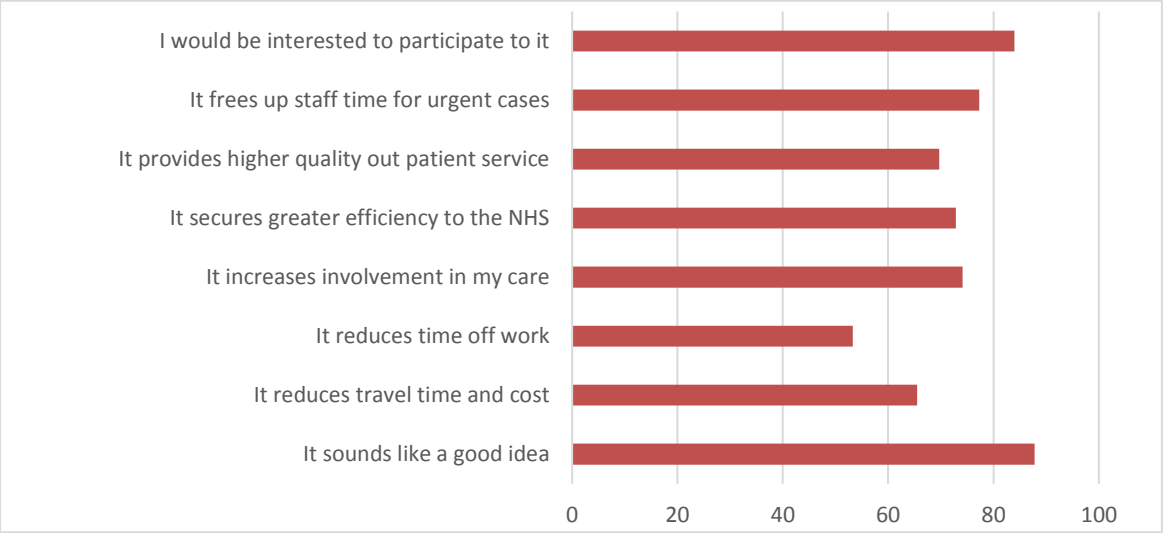
6.1.3. *Patient perceptions and satisfaction*

Results from the patient perceptions and satisfaction survey conducted by Aequus Research on behalf of the Royal Free with the OMS cohort confirmed that individuals receiving the OMS

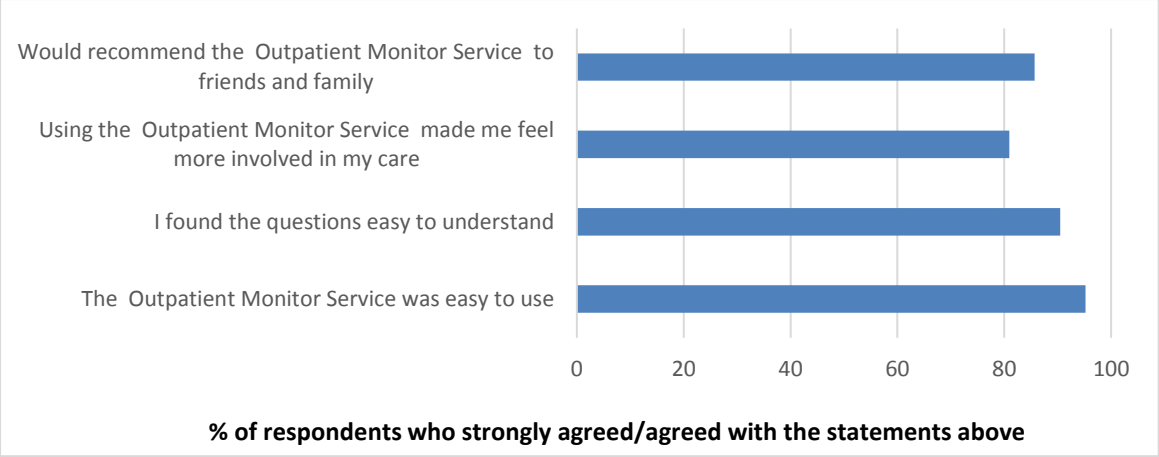
not only reported positive clinical, economic and safety (service improvement) outcomes but also were satisfied with the service received. Key findings showed that the majority agree/strongly agree with the statements in figures 1-2.

Figure 1: Results from perception and satisfaction survey

(a) Perception data on MS



(b) Satisfaction data on OMS



Details on the satisfaction data are in appendix; for information related to the survey methodology, population and data collection strategy please refer to Message Dynamics.

6.1.4. Comments on the headline findings

The study evaluated the introduction of an innovative OMS delivered to Gynaecological patients treated at the Royal Free Hospital. The OMS had positive impacts spanning clinical, safety and satisfaction areas and showed strong value also in economic terms when looking at the cost savings for the NHS in terms of reduced follow up consultations and DNAs. Data showed evidence about the value and positive impact of the OMS across different patient groups to include gynaecological and hysteroscopy interventions. For the vulval group a larger sample size would be needed to give us greater power to detect the impact of the OMS on clinical outcomes (follow-up visits and DNAs).

It is envisaged that the adoption of the OMS in consecutive years and across different hospital departments and hospital settings will provide more in-depth data set and enable the monitoring of the impact of the OMS across time as well as capture possible differences across patient groups and delivery systems.

7. Appendices

7.1. Appendix 1: Unit costs of data sources

Item	Cost per unit (£)	Source
Follow-up visit	135 Weighted average of all outpatient attendances	PSSRU (2016) Costs of Health and Social Care 2016[4]
Did not attend (DNA) appointment	141	Department of Health (2014) NHS waiting times for elective care in England[5]
Outpatient Monitor Service (OMS)	**Delivery costs per patient**	
Scenario 1	0	Discussion with experts
Scenario 2	2	Discussion with experts
Scenario 3	5	Discussion with experts
Scenario 4	10	Discussion with experts

[4] *http://www.pssru.ac.uk/project-pages/unit-costs/2016/index.php*
[5] *https://www.nao.org.uk/wp-content/uploads/2014/01/NHS-waiting-times-for-elective-care-in-England.pdf*

7.2. Appendix 2: Results for gynae group

Table 1: Patient Age and Type (new or follow up)

		OMS, N=47		Control, N=82		P Value
Age of Patients	Mean (StdDev)	51.62	(19.462)	47.87	(17.94)	0.28
Number of patients who had been seen at least once before the start of the Time Frame (Follow up patients)	Number (%)	24	51.06%	43	52.44%	0.02
Number of patients who had not been seen before the start of the Time Frame (New patients)	Number (%)	23	48.94%	39	47.56%	

Table 2a: Effectiveness of the OMS intervention in reducing numbers of subsequent appointments

		OMS, N=47		Control, N=82		P Value
Number of scheduled subsequent appointments	Number	57		173		
Number of scheduled subsequent appointments per patient	Mean (StdDev)	1.21	0.83	2.11	1.21	0.01
Number of scheduled subsequent appointments attended	Number	42		119		
Number of scheduled subsequent appointments attended per patient	Mean (StdDev)	0.89	0.84	1.45	1.21	<0.01
Number of patients discharged during the Time Frame	Number (%)	16	34.04%	37	45.12%	0.01
Number of these discharged because of Non attendance	Number (%)	3	6.38%	14	17.07%	sample size too small to test for difference
Number discharged for clinical reasons	Number (%)	13	27.66%	23	28.04%	not stat sign different
Elapsed time in days between first appointment and first scheduled subsequent follow up	Mean (StdDev)	190.59	41.95	193.76	94.30	not stat sign different
Elapsed time in days between first scheduled subsequent follow up and second	Mean (StdDev)	52.50	44.55	166.11	99.24	<0.01
Elapsed time in days between second scheduled subsequent follow up and third	Mean (StdDev)	0.00	0.00	111.40	59.69	<0.01
Elapsed time in days between third scheduled subsequent follow up and fourth	Mean (StdDev)	0.00	0.00	150.50	64.35	<0.01

Table 2b: Effectiveness of the OMS intervention in reducing the cost of subsequent appointments

		OMS, N=47		Control, N=82		P Value
NHS tariff cost of scheduled subsequent appointments per patient	Mean (StdDev)	£163.72	112.37	£284.82	162.95	<0.01
NHS tariff cost of attended subsequent appointments per patient	Mean (StdDev)	£120.64	113.42	£195.91	163.15	<0.01

Table 3a: Effectiveness of the OMS intervention in reducing DNA rate

		OMS, N=47		Control, N=82		P Value
Number of patients who did not attend at least one scheduled subsequent appointment	Number (%)	3	6.38%	24	29.27	0.01

Table 3b: Effectiveness of the OM intervention in reducing the cost of DNAs

		OMS, N=47		Control, N=82		P Value
NHS tariff cost of DNAs per patient	Mean (StdDev)	£43.09	84.95	£88.90	134.53	0.02

Table 4: Economic Sensitivity analysis

	Intervention Cost		OMS, N=47		Control, N=82		P Value
NHS tariff cost of scheduled subsequent appointments per patient	£0	Mean (StdDev)	£163.72	112.37	£284.82	162.95	<0.01
NHS tariff cost of attended subsequent appointments per patient		Mean (StdDev)	£120.64	113.42	£195.91	163.15	<0.01
NHS tariff cost of DNAs per patient		Mean (StdDev)	£43.09	84.95	£88.90	134.53	0.02
NHS tariff cost of scheduled subsequent appointments per patient	£2	Mean (StdDev)	£165.72	112.37	£284.82	162.95	<0.01
NHS tariff cost of attended subsequent appointments per patient		Mean (StdDev)	£122.64	113.42	£195.91	163.15	<0.01
NHS tariff cost of DNAs per patient		Mean (StdDev)	£45.09	84.95	£88.90	134.53	0.02
NHS tariff cost of scheduled subsequent appointments per patient	£5	Mean (StdDev)	£168.72	112.37	£284.82	162.95	<0.01
NHS tariff cost of attended subsequent appointments per patient		Mean (StdDev)	£125.64	113.42	£195.91	163.15	<0.01
NHS tariff cost of DNAs per patient		Mean (StdDev)	£48.09	84.95	£88.90	134.53	0.04
NHS tariff cost of scheduled subsequent appointments per patient	£10	Mean (StdDev)	£173.72	112.37	£284.82	162.95	<0.01
NHS tariff cost of attended subsequent appointments per patient		Mean (StdDev)	£130.64	113.42	£195.91	163.15	<0.01
NHS tariff cost of DNAs per patient		Mean (StdDev)	£53.09	84.95	£88.90	134.53	0.07

7.2.1. Appendix 3: Results for Vulval group

Table 1: Patient Age and Type (new or follow up)

		OMS, N=48		Control, N=65		P Value
Age of Patients	Mean (StdDev)	59.76	16.36	60.81	17.70	0.75
Number of patients who had been seen at least once before the start of the Time Frame (Follow up patients)	Number (%)	33	80.49	55	76.39	0.61
Number of patients who had not been seen before the start of the Time Frame (New patients)	Number (%)	14	19.51	27	23.61	

Table 2a: Effectiveness of the OMS intervention in reducing numbers of subsequent appointments

		OMS, N=48		Control, N=65		P Value
Number of scheduled subsequent appointments	Number					
Number of scheduled subsequent appointments per patient	Mean (StdDev)	0.29	0.72	2.49	1.32	<0.01
Number of scheduled subsequent appointments attended	Number					
Number of scheduled subsequent appointments attended per patient	Mean (StdDev)	0.22	0.42	2.14	1.36	<0.01
Number of patients discharged during the Time Frame	Number (%)	5	12.20	33	45.83	<0.01
Number of these discharged because of Non attendance	Number (%)	1	2.44	6	8.33	sample size too small to test for difference
Number discharged for clinical reasons	Number (%)	4	9.76	27	37.50	sample size too small to test for difference
Elapsed time in days between first appointment and first scheduled subsequent follow up	Mean (StdDev)	151.00	52.16	160.30	78.14	0.65

Elapsed time in days between first scheduled subsequent follow up and second	Mean (StdDev)	38.00	0.00	131.80	78.99	sample size too small to test for difference
Elapsed time in days between second scheduled subsequent follow up and third	Mean (StdDev)	19.00	0.00	107.79	65.93	sample size too small to test for difference
Elapsed time in days between third scheduled subsequent follow up and fourth	Mean (StdDev)	71.00	0.00	133.80	89.05	sample size too small to test for difference

Table 2b: Effectiveness of the OMS intervention in reducing the cost of subsequent appointments

		OMS, N=48		**Control, N=65**		**P Value**
NHS tariff cost of scheduled subsequent appointments per patient	Mean (StdDev)	39.51	96.62	335.63	178.40	<0.01
NHS tariff cost of attended subsequent appointments per patient	Mean (StdDev)	29.63	56.57	288.75	183.10	<0.01

Table 3a: Effectiveness of the OMS intervention in reducing DNA rate

		OMS, N=48		**Control, N=65**		**P Value**
Number of patients who did not attend at least one scheduled subsequent appointment	Number (%)	1.00	2.40	8.00	11.10	n/a

Table 3b: Effectiveness of the OMS intervention in reducing the cost of DNAs

		OMS, N=48		**Control, N=65**		**P Value**
NHS tariff cost of DNAs per patient	Mean (StdDev)	9.88	63.25	46.88	96.55	0.02

Table 4: Economic Sensitivity analysis

	Intervention Cost		OMS, N=48		Control, N=65		P Value
NHS tariff cost of scheduled subsequent appointments per patient	£0	Mean (StdDev)	39.51	96.62	335.63	178.40	<0.01
NHS tariff cost of attended subsequent appointments per patient		Mean (StdDev)	29.63	56.57	288.75	183.10	<0.01
NHS tariff cost of DNAs per patient		Mean (StdDev)	9.88	63.25	46.88	96.55	0.02
NHS tariff cost of scheduled subsequent appointments per patient	£2	Mean (StdDev)	41.51	96.62	335.63	178.40	<0.01
NHS tariff cost of attended subsequent appointments per patient		Mean (StdDev)	31.63	56.57	288.75	183.10	<0.01
NHS tariff cost of DNAs per patient		Mean (StdDev)	11.88	63.25	46.88	96.55	0.02
NHS tariff cost of scheduled subsequent appointments per patient	£5	Mean (StdDev)	44.51	96.62	335.63	178.40	<0.01
NHS tariff cost of attended subsequent appointments per patient		Mean (StdDev)	34.63	56.57	288.75	183.10	<0.01
NHS tariff cost of DNAs per patient		Mean (StdDev)	14.88	63.25	46.88	96.55	0.04
NHS tariff cost of scheduled subsequent appointments per patient	£10	Mean (StdDev)	49.51	96.62	335.63	178.40	<0.01
NHS tariff cost of attended subsequent appointments per patient		Mean (StdDev)	39.63	56.57	288.75	183.10	<0.01
NHS tariff cost of DNAs per patient		Mean (StdDev)	19.88	63.25	46.88	96.55	0.08

7.2.2. Appendix 4: Results for Hysteroscopy group

		OMS, n=72		Control, n=144		P value
Age of Patients	Mean (StdDev)	56.06	12.05	55.88	11.97	0.92
Patients who received the letter with the test results	Number (%)	57.00	79.17	139.00	96.53	0.01

7.2.3. Appendix 5: Results from perception and satisfaction survey

Table 1: Results from perception survey

Questions	Total responses (n= 475)											
	Strongly Agree		Agree		Neutral		Disagree		Strongly disagree		Not answered	
The automated follow up service (OMS) …	n	%	n	%	n	%	n	%	n	%	n	%
… Sounds like a good ideasounds like a good idea	227	47.79	190	40.00	44	9.26	5	1.05	7	1.47	2	0.42
… Reduces travel time and cost	194	40.84	117	24.63	70	14.74	6	1.26	10	2.11	78	16.42
… Reduces time off work	170	35.79	83	17.47	61	12.84	13	2.74	12	2.53	136	28.63
… Increases involvement in my care… Increases involvement in my car … Increases involvement in my care	214	45.05	138	29.05	50	10.53	14	2.95	10	2.11	49	10.32
… produces greater efficiency to the NHS	229	48.21	117	24.63	47	9.89	3	0.63	4	0.84	75	15.79
… produces higher quality out patient service	207	43.58	124	26.11	61	12.84	11	2.32	6	1.26	66	13.89
… Frees up staff time for urgent cases	265	55.79	102	21.47	32	6.74	4	0.84	3	0.63	69	14.53
I would be interested to participate in the OMS	268	56.42	131	27.58	49	10.32	11	2.32	14	2.95	2	0.42

Table 2: Results from satisfaction survey

Questions	Total responses (n= 42)									
	Strongly Agree		Agree		Neutral		Disagree		Strongly disagree	
	n	%	n	%	n	%	n	%	n	%
The OMS was easy to use	33	78.57	7	16.67	2	4.76	0	0.00	0	0.00
I found the questions easy to understand	29	69.05	9	21.43	4	9.52	0	0.00	0	0.00
Using the OMS made me feel more involved in my care	25	59.52	9	21.43	4	9.52	3	7.14	1	2.38
Would recommend the OMS to friends and family	26	61.90	10	23.81	3	7.14	2	4.76	1	2.38
	Yes				No					
Did you use the OMS to request a call back from the clinic?	10				32					
If so, did you receive the requested call back from the clinic?	10				32					