Method for Aggregating The Reporting of Interventions in Complex Studies (MATRICS): development and testing

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Method for Aggregating The Reporting of Interventions in Complex Studies (MATRICS) tool: development and testing

ABSTRACT

Objective: To develop a tool for the accurate reporting and aggregation of findings from each of the multiple methods used in a complex evaluation in an unbiased way.

Study Design and Setting: We developed a Method for Aggregating The Reporting of Interventions in Complex Studies (MATRICS) tool using the ENIGMA study. We subsequently tested it on the MINuET trial. We created three layers to define the effects, methods, and findings from ENIGMA. We assigned numbers to each effect in layer 1 and letters to each method in layer 2. We used an alphanumeric code based on layer 1 and layer 2 to every finding in layer 3 to link the aims, methods, and findings. We illustrated analogous findings by assigning more than one alphanumeric code to a finding. We also showed that more than one effect or method could report the same finding. We presented contradictory findings by listing them in adjacent rows of the MATRICS.

Results: MATRICS was useful for the effective synthesis, and presentation of findings of the multiple methods from ENIGMA. We subsequently successfully tested it by applying it to the MINuET trial.

Conclusion: MATRICS is effective for synthesising the findings of complex, multiple-method studies.

(198)

Key words: Complex interventions, reporting, synthesis of multiple methods, evaluation, methodology.

What is new?

Key Findings

- We successfully developed and tested the MATRICS tool in two complex, multiple method gastroenterology studies

What this study adds to what is known

- The synthesis of numerous findings from multiple-methods in complex studies can be difficult. Reporting findings separately may cause a lack of integration of results which may not yield valid findings. MATRICS facilitates the useful synthesis and presentation of findings from multiple method studies.

What is the implication? What should change now?

- MATRICS presents easily understandable results, without the need to study complex figures and tables. As both quantitative and qualitative results can be synthesised into one finding, it does not inadvertently bias the findings towards one paradigm but instead illustrates the different methodologies and balances the effects of findings.
- MATRICS can be applied to any complex study design using multiple methods to facilitate synthesis and interpretation of findings.

1. BACKGROUND

Using complex, multiple-methods in health services research has the potential to yield high-quality research, especially in the case of studies which utilise the strengths of both quantitative and qualitative approaches. Whether used sequentially or concurrently, multiple methods can provide a wealth of information, synthesise complementary findings, highlight underlying issues and generate more comprehensive and general conclusions than single methods used alone. A recent survey of 75 multiple-method studies found that "combining methods yielded confirmation, complementarities, development and expansion"[1]. The triangulation of methods following the use of differing techniques to explain the same dependent variable supports the validity of conclusions drawn, where mutual confirmation of results can be shown[2].

The synthesis of numerous findings from multiple-methods in complex studies can be difficult. Many articles report results separately and in parallel, with little or no integration[3]. Although there are validated strategies for aggregating quantitative and qualitative results separately[4,5,6,7], combining and synthesising findings from multiple-method studies can be more difficult[8]. Reporting such findings separately may not yield valid findings. In particular conclusions may disproportionally represent one aspect of the design rather than present a balanced and rigorous synthesis of all the methods used in the study[8].

The main reason for this lack of rigour is that there is no agreed framework for synthesising the findings from multiple-method studies or studies investigating complex interventions[9]. It is important to depict comparable results in a format that highlights that different facets of a

study are complementary in their findings, and that each facet adds to the others, since this is the major strength of multiple-method studies[10,11].

Tools do exist to aggregate findings from multiple-method studies[11,12,13], but we decided that these were not suitable for the ENIGMA study because they were unable to convey: the outcomes of the complex interventions without disproportionally representing one facet of the study design; or whether the findings from each method were complementary or contrasting in a reader-friendly format. To address this, we developed the *Method for Aggregating The Reporting of Interventions in Complex Studies (MATRICS)* tool**.**

We believe the MATRICS tool can offer the user the ability to juxtapose findings visually. It can be applied to any study design (e.g. cohort study, RCT, or any multiple-method study) but is best for studies investigating complex interventions, usually using multiple methods. We originally developed this approach to synthesise numerous findings from our complex, multiple-method evaluation of the modernisation of endoscopy services in the National Health Service (NHS) in England – the ENIGMA study[14]. We have since applied it to a complex multiple-method Randomised Controlled Trial (RCT) of nurse endoscopists – MINuET[15] to test its generalisability.

2. METHODS

We developed the MATRICS proforma in Figure 1which requires the user to identify:

1. all potential effects of the intervention(s) under evaluation (derived from the aims and objectives of the study) – layer 1
2. all methods used in that evaluation – layer 2
3. all research findings – layer 3

[Insert Figure 1 here]

Layer 1 has headings in each column which are customised for the study where necessary. We investigated patients and NHS endoscopy services in the ENIGMA case study.

The completion of the MATRICS proforma is undertaken as follows:

2.1 Step 1 – Identify, categorise and code all effects sought by each component of the study

The effects are defined by the aims and objectives of the study, but also permit unexpected effects to emerge over the course of the evaluation.

Firstly, all effects are categorised into three groups (termed "effect categories"):

- Effects on the sample population *(can be altered to be more specific);*
- Effects on the specialty being investigated *(can be altered to be more specific);*
- Effects on the rest of the organisation and society *(can be altered to make it more appropriate to a larger study context).*

Secondly, layer 1 on the MATRICS proforma is completed with a list of effects to be evaluated by the study using one cell per effect (under the appropriate effect category column). Each effect is assigned a unique number, starting at "1". Any effects subsequently identified are included as they arise, and assigned the next available number.

2.2 Step 2 – Identify and code all methods used by each component of the study

Each method (or instrument) employed by the study is listed in layer 2 of the MATRICS proforma (e.g. questionnaires, case report forms, interviews, routine data, etc.). Each method is assigned a unique letter, starting with "A".

2.3 Step 3 – Create an alphanumeric code

All numbered effects in layer 1 are assigned letters according to how those effects are investigated. The letters are derived from the method to which they correspond. For example, if patient satisfaction is effect 1 and it is investigated using a patient satisfaction questionnaire which is assigned method A, we record [A] alongside effect 1 in layer 1.

In layer 2, the appropriate number from layer 1 is assigned to each method to illustrate all the effects they are investigating. For example, patient satisfaction (method A) has effect 1 recorded alongside it in layer 2.

As each effect is likely to be investigated by more than one method, more than one letter can be associated with each number (effect) in layer 1. The same principle applies for one method being used to investigate more than one effect. For example, patient interviews [B] may also determine patient satisfaction so we would enter [1] after method [B], and alter effect [1] to have [A, B] investigating patient satisfaction.

2.4 Step 4 – Identify and code all research findings reported by the study

The individual findings from each component of the study are listed in layer 3 of the MATRICS proforma. Findings are primarily textual but in the case of some quantitative findings, they can also include summary statistics to provide more detail where necessary. The degree of detail in the findings is at the discretion of the user but if the findings are too detailed, the chances of merging analogous findings are reduced.

Each finding in layer 3 is then labelled using an alphanumeric code derived from layers 1 and 2 (detailed in step 3 above) to help the reader identify which effects are being investigated and which method(s) are being used to produce that finding.

2.5 Step 5 – Refine Layer 3 by synthesising all complementary research findings and reordering contrasting findings

All comparable findings, irrespective of which effects are investigated or which methods are used, are merged into one composite statement. Care is taken to ensure that the final statement is still representative of the original individual findings.

All alphanumeric codes associated with each finding making up a final statement are reported separately alongside the statement. For example, on synthesising the finding that patient satisfaction (effect1) is poor, from both patient questionnaires (method A) and interviews (method D) into one accurate statement, one row in layer 3 is used but two alphanumeric codes are assigned. This illustrates that more than one effect or method are reporting the same outcome. This allows the reader tquickly to identify the common findings of the study

and how they are identified, and to appreciate how many facets of the study produced consistent findings.

Where findings are not comparable or even opposing, they remain separate in layer 3, but are placed adjacent to each other in the list to make them more visually obvious. We classified findings as discordant if the effects being investigated produced conflicting findings when different methods addressed the same objective.

We designed the MATRICS tool to illustrate whether there was any agreement or discordance in the effects evaluated by different methods, not to examine the degree of this agreement or discordance. We developed the tool with the intention of applying it to existing results and data without more detailed scrutiny of individual findings. Where significance or otherwise is clear we include this in the assimilation of findings to illustrate agreement or discordance, but we exclude judgements regarding the scale of the difference or effect size.

Although we illustrate comparability and discordance of findings initially within specific domains, for example ‘effects on patients’, or ‘effects on services’, the final discussion of MATRICS findings should draw out agreement and discordance both within and across domains.

3. RESULTS

We present two examples: the ENIGMA study[14] which initiated the development of MATRICS, and the MINuET study,[15] which we used to test and illustrate the application and potential of MATRICS in practice.

3.1 CASE STUDY 1 - ENIGMA

The study of 'Evaluating New Innovations in (the delivery and organisation of) Gastrointestinal (GI) endoscopy services by the NHS Modernisation Agency' (ENIGMA) [16] was a complex intervention study designed to evaluate the Modernising Endoscopy Services (MES) Programme in England with particular reference to GI endoscopy, using ten different research methods including focus groups[17,18] and routinely collected data[16].

Appendices 1 and 2 depict layers 1-3 of the ENIGMA MATRICS published in the final report[14]. In layer 1 we illustrate the effects being investigated in consecutive numerical order from 1 to 14, which we broke down into effects on patients, effects on endoscopy services, and effects on other health services and society. We placed a letter alongside each effect which relates to the specific methods we used to investigate the effect (Appendix 1). In layer 2, we list the specific methods employed in the study. We assigned each method a letter code from A to M, which we referenced back to layer 1. We similarly documented the numerical effect code alongside the method code in layer 2. In Appendix 2 we illustrate the findings from the study (broken down into effects on patients, effects on endoscopy services and effects on the health service and society) using the alphanumeric code built in layers 1 and 2. For example, the first row, related to effects on patients shows that: "3E, 5E, 5M, 8E, 9E, 9F, - access to and acceptability of endoscopy services have improved with shorter waiting times, greater throughput, more patient information, more responsiveness to patient views, and better communication between reception staff and patients". This means that to examine four different effects: 3- patient experience of the referral process; 5- waiting times; 8- organisation, function and process of service delivery; and 9- accessibility of services, we used three different methods: E- semi-structured patient interviews; F- interviews with health

professionals and key people; and M- analysis of time taken from referral to procedure. We generated comparable findings regarding the access to, and acceptability of, endoscopy services.

3.2 CASE STUDY 2 – MINuET

The findings from the Multi-Institutional Nurse Endoscopy Trial (MINuET) [15] on the clinical effectiveness and cost-effectiveness of nurse endoscopists were published as a Health Technology Assessment (HTA) monograph[15] and in the British Medical Journal as two separate articles[19,20].

The MINuET study was an RCT comparing the clinical and cost-effectiveness of doctors and nurses undertaking upper and lower gastrointestinal endoscopy in 23 endoscopy units in England, Scotland and Wales. We used this trial to test the MATRICS approach in practice because the ENIGMA team had access to both the raw data and the detailed findings.

Appendix 3 and 4 summarise layers 1-3 of the MINuET MATRICS. We present the findings again related to effects on patients, effects on endoscopy services, and effects on the rest of society. In layer 1 (Appendix 3) of tMATRICS we illustrate that 11 effects were investigated in the MINuET trial. In layer 2 we list the 10 specific methods (from A to J) that we used to explore these effects. We illustrate the findings from the MINuET trial in layer 3 (Appendix 4). We show, for example, that we measured the effect on patient quality of life (system-specific [1] and generic [3]) using the Gastrointestinal Symptom Rating Questionnaire (GSRQ) [A] and the Short-Form 36 (SF-36) [C] tools. Our findings concluded that "1A, 3C - system-specific and generic quality of life improved in both the doctors and nurses groups at

one month and one year post endoscopy but there we found no statistically significant difference between the groups".

4. DISCUSSION

Our experience with the ENIGMA study illustrates that the MATRICS approach can facilitate the synthesis of findings from complex studies and is particularly useful when the study uses multiple methods. We also tested MATRICS on the findings reported by the MINuET study. Whilst this RCT was not as complex as the ENIGMA study, we successfully applied MATRICS to synthesise the findings from MINuET to produce clear statements that did not disproportionately represent just aspect of the trial.

The MATRICS tool has four main strengths. First it makes users consider whether study findings can be combined in a coherent statement. Second, it clarifies which components of the study generate complementary findings by providing a simple synthesis of those results with easy identification of their origins. Third it helps present opposing findings by listing incongruent results separately but adjacent to one another. Finally its completion does not require formal meta-analysis of quantitative data to produce a common finding; instead it uses sentences which summarise the findings of each facet of the study and, where findings are consistent or even repetitious, it facilitates their synthesis. The summative presentation of findings and clustering also draws out and clarifies discrepancies.

By reporting results in one or two summary sentences, MATRICS presents easily understandable results, without requiring readers to study complex figures and tables. As both quantitative and qualitative results can be synthesised into one finding, it does not inadvertently bias the findings towards one paradigm but instead clearly illustrates the

different methodologies and balances the effects of findings. We present this balancing of the findings as a strength of MATRICS but it may also be considered as a weakness. It may be that results from some methods are presented with less certainty than others and users should bear this in mind when discussing their MATRICS findings.

In economic terms, MATRICS can be regarded as a visual presentation of Cost-Consequence Analysis (CCA). Although the more powerful technique of Cost Utility Analysis (CUA) provides clearer conclusions by identifying the incremental cost of producing an additional unit of health benefit (usually a quality-adjusted life year), it does not take account of non-health benefits or differences in process utility from different approaches to service delivery, – both of which may be valued and thus important to decision makers.

We believe that the MATRICS proforma in Figure 1 would be suitable for many types of study. It is also feasible to use MATRICS to classify prior hypotheses as a yardstick for future outcomes. Nevertheless, we recommend further testing across different study designs and in fields like public health and health promotion to ensure that the tool is equally useful there. User should edit the column headings in layers 1 and 3 to reflect the service or specialty that they are studying, so long as they honour the principles to be applied to those layers. In our case studies, we evaluated the impact of two interventions on endoscopy services and altered those column titles accordingly. Users may also find it helpful to replace the letters that define individual methods by short abbreviations like IV for interviews and FG for focus groups.

5. CONCLUSION

We have shown that the MATRICS tool provides a useful structure for reporting the results of complex or multiple-method studies. We expect further application of this methodology to confirm that this reporting tool improves a readers' understanding of studies and their findings.

Main text word count (excluding abstract, tables and references)= 2555

6.STATEMENT OF COMPETING INTERESTS

None of the authors has any competing interests.

7.AUTHORS' CONTRIBUTIONS

HH led thewriting of the paper. ITR conceived the MATRICS; ITR and GSJ developed and applied the MATRICS for the ENIGMA study; KT compiled the MATRICS in the ENIGMA final report; KT and DD applied the MATRICS to the MINuET study; JGW was the chief investigator of both ENIGMA and MINuET studies; all other authors contributed their ENIGMA study results to the MATRICS and commented on all drafts of the paper.

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9. DEPARTMENT OF HEALTH DISCLAIMER

The views and opinions expressed herein are those of the authors and do not necessarily reflect those of the Department of Health.

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Method for Aggregating the Reporting of Interventions in Complex Studies (MATRICS)

Layer 1 – Effects sought[1]

Effects on patients	Effects on the healthcare specialty being investigated	Effects on the rest of the health service and society

[1] Derived from the aims and objectives of the study.

Layer 2 – Methods used

Code	Method

Layer 3 – Findings reported

Code(s)	Findings
Effects on patients	
Effects on the healthcare specialty being investigated	
Effects on the rest of the health service and society	

Figure 1: The MATRICS proforma. The "Effects on the healthcare specialty being investigated" can be adapted to suit the particular needs of the study using it e.g. diabetes clinic or emergency department..

Layer 1 – Effects		
Effects on patients	**Effects on endoscopy services**	**Effects on the rest of the health service and society**
1 - Patient Quality of Life **[B,D]**	**6** - Cost of modernisation **[H]**	**14** – Patients' time off work **[I]**
2 - Health gain **[C]**	**7** – Service performance **[A]**	
3 - Patient experience of referral process **[E]**	**8** – Organisation, function and process of service delivery **[E, F, G, J]**	
4 – Patient satisfaction with endoscopy **[L]**	**9 –** Accessibility of services **[E, F, K]**	
5 – Waiting times **[E, M]**	**10 –** Appropriateness and acceptability of services **[F, G, K]**	
	11 – Reliability and availability of routinely collected process data **[A]**	
	12 – Patient use of drugs **[I]**	
	13 – Patient use of primary and secondary care resources **[I]**	

Layer 2 – Methods		
Code	**Method**	
A [7, 11]	Process data analysis	
B [1]	Analysis of SF-36 scores	

C [2]	Analysis of EQ-5D scores
D [1]	Analysis of Gastrointestinal Symptom Rating Questionnaire (GSRQ) scores
E [3, 5, 8, 10]	Semi-structured patient interviews
F[8, 9, 10]	Interviews with health professionals and key people
G[8, 10]	Focus groups with health professionals
H [6]	Health economic site visits
I [12, 13, 14]	Health economic patient reported resource use
J [8]	Innovations form
K [9, 10]	GP questionnaire
L [4]	Analysis of Gastrointestinal Endoscopy Satisfaction Questionnaire (GESQ) scores
M [5]	Analysis of time taken from referral to procedure

Each number denotes the effects being investigated and the letters identify the specific method used in the study

Appendix 1.: Layers 1 and 2 of the ENIGMA MATRICS illustrating the effects being investigated and the methods used to do so.

Layer 3 – Findings (as reported in ENIGMA final report)	
Code	**Finding(s)**
Effects on patients	
3E, 5E, 5M, 8E, 9E, 9F	Access to and acceptability of endoscopy services have improved greater throughput, more patient information, more responsiveness to patient views and better communication between reception staff and patients.
1B	Patients had improved SF-36 PCS and MCS 12m following endoscopy but there was no significant difference between Intervention and Control groups (SF36 PCS, p = 0.92; MCS, p = 0.42)
5M	There was a significant difference in overall waiting times between Intervention and Control sites (60.04 days Vs. 66.96 days, p = 0.002).
3E	'Urgent' patients satisfied with waiting time. Majority of non-urgent patients satisfied with waiting time. Fewer patients saying they would like procedure sooner.
3E	No change in experience for patients who had had previous endoscopy
9F, 10F	There is greater commitment to patient satisfaction and involvement.
10F	Difficult to assess if patients are at the centre of 'quality agenda' or benefit as units strive to reach targets.
10G	External/government targets implemented through Trusts and management force clinicians to concentrate predominantly on meeting targets rather than focussing on patient care.
4L	There were no differences between Intervention and Control groups in patient satisfaction as measured by the GESQ following endoscopy
5M	There were significant differences in patient waiting times between Intervention and Control groups. These favoured the Intervention group for the first four

	waves of recruitment and the Control group for Wave 5.
1D	Patients had fewer GI symptoms as measured by GSRQ 12m following endoscopy but there were no significant differences between Intervention and Control groups for any of the GSRQ measures (GSRQ1, p = 0.74; GRSQ2, p = 0.52; GSRQ3, p = 0.46; GSRQ4, p = 0.99).
2C	Patients had improved EQ-5D 12m following endoscopy but there were no significant differences between Intervention and Control groups.
Effects on endoscopy services	
10F	MES Programme training offered too early by ill prepared teachers and project staff lacked credibility.
9F	Some Government targets helped put endoscopy in spotlight. Others impact negatively on some patients
10F	Working relationships of staff sharing endoscopy improving but still some resistance from clinicians
10F	Strong leadership, communication, staff ownership important in introducing change
8F	Training important to update staff and ensure appropriate skill mix but time, sparse financial resources and insufficient staff impede this
10F	Staff respond positively, are supportive and co-operative and welcome the challenge of new ways of working
9K	There was no significant difference between GPs who referred patients to Intervention and Control sites regarding perception of accessibility to services
10K	There was no significant difference between the GPs who referred to the Intervention and Control sites regarding appropriateness and acceptability of services
8F	Ongoing financial constraints that lead to crisis management, ad hoc change, and make forward planning difficult

9F	Lack of resources impacts on staffing, equipment, information technology and facilities
8F	Some change processes are cost neutral
8G	Discord between members of staff from various specialties using endoscopy units.
8G, 10G	Welsh units see themselves as lagging behind their English counterparts, but are learning from the successes and mistakes.
8G	Changes to improve processes, such as pooled lists, did not require additional resources.
8G	Lack of recognition and appreciation of professionals by management and Trusts lead to disillusionment amongst senior clinicians; an erosion of professional self-identity.
8G, 10G	Resource deficits and allocation of funds based on poorly informed decisions.
8G, 10G	Lack of management involvement and/ or interest in clinical processes and patient care
7A	There was no statistically significant improvement in the delivery of endoscopy services in Intervention sites
7A	There was no statistically significant improvement in the delivery of endoscopy services in Control sites
7A	There was no significant difference between the endoscopy services of the Intervention and Control sites at any time
11A	Process data was not routinely collected by many endoscopy units, but especially not by the Intervention sites
11A	The majority of routinely collected process data from endoscopy units and Trusts was highly comparable with the equivalent Hospital Episode Statistics (HES) datasets
12I	Overall resource investments in modernisation in terms of one-off costs, investments which produce a flow of benefits and increase in annual revenue

	costs.
13I	Tendency toward lower use of drugs by patients in Intervention sites
12I, 13I	Some tendency toward reduction in primary and secondary NHS resource use
8J	There was no significant difference in the average number of innovations introduced by Intervention and Control sites
6H	All sites made major investments in modernisation: in staff, training, equipment and modernisation activities.
6H	The Intervention did not significantly affect overall levels of investment in modernisation.
6H, 12I	All sites made major investments in modernisation: in staff, training, equipment and modernisation activities, but there were no significant differences in overall levels of investment in modernisation.
Effects on the rest of the health service and society	
8F, 8G	Change due to natural realignment and evolution of services rather than as a response to specific innovations.
8F	External body can be a catalyst for change.
8F	The nature of change is ad-hoc rather than specific.
14I	Tendency toward less time off work by patients = less lost productivity to industry.
8F	There have been some successes in getting funding, with Global Rating Scale (GRS) and National Bowel Cancer Screening Programme (NBCSP) useful leverage tools.
10G	GRS and NBCSP help raise the political visibility and image of endoscopy units within the Trusts affecting targets and funding allocation.

Appendix 2: Layer 3 of the ENIGMA MATRICS illustrating the findings of the study. All analogous findings are synthesised into one row which has a general statement of the findings and the alphanumeric codes applied to those results when they were individual findings. All contradictory or dissimilar findings are reported adjacent to each other.

<table>
<tr><th colspan="3">Layer 1 – Effects</th></tr>
<tr><th>Effects on patients</th><th>Effects on endoscopy services</th><th>Effects on the rest of the health service and society</th></tr>
<tr><td>1 - System-specific quality of life [A]</td><td rowspan="3">9 – Quality of endoscopy undertaken by nurses in comparison to doctors [I]</td><td rowspan="9">11 – Development of economic model to predict effect of nurse endoscopies on labour market & training requirements for clinical nurse specialists [G, H, I, J]</td></tr>
<tr><td>2 - Patients anxiety levels [B]</td></tr>
<tr><td>3 – Generic quality of life [C, G]</td></tr>
<tr><td>4 - Patient satisfaction [D]</td><td rowspan="6">10 – Cost to endoscopy service [J]</td></tr>
<tr><td>5 - Patient preference for specific operator [E]</td></tr>
<tr><td>6 – Outcome for patients [F]</td></tr>
<tr><td>7 - Total health benefit [G]</td></tr>
<tr><td>8 – Resources consumed by patients [H]</td></tr>
<tr><th colspan="3">Layer 2 – Methods</th></tr>
<tr><th>Code</th><th colspan="2">Method</th></tr>
<tr><td>A [1]</td><td colspan="2">Analysis of GSRQ</td></tr>
<tr><td>B [2]</td><td colspan="2">Analysis of State-Trait Anxiety Inventory (STAI) scores</td></tr>
<tr><td>C [3]</td><td colspan="2">Analysis of SF-36 scores</td></tr>
</table>

D [4]	Analysis of GESQ scores
E [5]	Analysis of preference questionnaire (stated and revealed)
F [6]	Analysis of complication form and medical records
G [3, 7, 11]	Analysis of EQ-5D scores
H [8, 11]	Resource use (patient reported & from clinical trial proformas)
I [9, 11]	Analysis of procedural details from video recordings, endoscopy reports, medical records
J [10, 11]	Analysis of unit costs, procedural and staff data, GP questionnaire and analysis of medical records

Each number denotes the effects being investigated and the letters identify the specific method used in the study

Appendix 3 : Layers 1 and 2 of the MINuET MATRICS illustrating the effects being investigated and the methods used to do so.

Layer 3 – Finding(s)	
Code	**Findings**
Effects on patients	
A1, C3	Patient system-specific and generic quality of life improved in both the doctors and nurses groups at 1month and 1year post-endoscopy but there was no statistically significant difference between the groups.
B1	There was no significant difference in the anxiety levels between patients in the doctor group and those in the nurse group at 1 day, 1 month or 1 year.
D4	Patients were significantly more satisfied following endoscopy by a nurse.
E5	Patients in both groups overwhelmingly recommended endoscopy, regardless of whether it was by a nurse or a doctor.
F6	No significant difference in complication rates or new GI diagnosis 1y after endoscopy
Effects on endoscopy services	
I9	No significant difference in quality of examination (flexible sigmoidoscopy or upper GI examination) and of endoscopy reporting
I9	There were no significant differences in the major diagnosis when procedures were performed by nurses compared with doctors.
J10	The doctor group cost £739 per patient whilst the nurse group cost £683 per patient
J10	The nurse-based programme resulted in an increase in resource use but this was outweighed by the reduced cost of the intervention delivered by this group.
Effects on the rest of health service and society	

G11, H11, I11, J11	An economic model to predict effect of nurse endoscopies on labour market & training requirements for clinical nurse specialists

Appendix 4: Layer 3 of the MINuET MATRICS illustrating the findings of the study. All analogous findings are synthesised into one row which has a general statement of the findings and the alphanumeric codes applied to those results when they were individual findings. All contradictory or dissimilar findings are reported adjacent to each other.