

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

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Summary

- **Aim** – to develop a reporting tool which would allow us to accurately aggregate the findings of complex studies.
- **Context** – The ENIGMA study
- **Result** – Method for Aggregating The Reporting of Interventions in Complex Studies (MATRICS)
- **Presentation** – describe MATRICS using the ENIGMA study as an example of its application



Complex studies

- Definition of “complex”
 - *multiple interventions*
 - *multiple (possibly mixed) methods*
 - *both*
- **BENEFITS:** High-quality research, especially where both quantitative and qualitative approaches are used.
- **DISADVANTAGES:** Synthesis of findings can be difficult. Many articles report results separately and in parallel with little or no integration.



Existing validated strategies for aggregating quantitative and qualitative results could not be applied:

- disproportionate representation one aspect of the study
- not easily understood by a non-specialist reader
- Needed to develop one ourselves.



ENIGMA

- ENIGMA - “Evaluating iNnovations in (the delivery and organisation of) Gastrointestinal (GI) endoscopy services by the NHS Modernisation Agency”. (funded by NIHR SDO) - <http://www.sdo.nihr.ac.uk/files/project/46-final-report.pdf>
- Complex intervention being evaluated = Modernising Endoscopy Services (MES) programme (England only).
- 10 sites receiving “MES” and 10 who did not and were left to redesign independently (control).
- Multiple mixed methods design



MATRICES proforma

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

Layer 1 – Effects sought¹

Effects on patients	Effects on the NHS specialty being investigated	Effects on the rest of the NHS 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 NHS specialty being investigated	
Effects on the rest of the NHS and society	



MATRICES completion – step 1

Completion of Layer 1 :

- a) Identify all “effects” being investigated (derived from the aims and objectives of the study)

NOTE: include unexpected effects which emerge over the course of the study

- b) Enter into Layer 1 according to whether it is an:

- Effect on the **sample population**
- Effect on the **specialty** being investigated
- Effect on the **rest of the organisation and society**

- c) Assign each effect a unique number

Application to ENIGMA



Layer 1 - Effects		
Effects on patients	Effects on endoscopy services	Effects on the rest of the NHS and society
1 - Patient Quality of Life	6 - Cost of modernisation	14 - Patients' time off work
2 - Health gain	7 - Service performance	
3 - Patient experience of referral process	8 - Organisation, function and process of service delivery	
4 - Patient satisfaction with endoscopy	9 - Accessibility of services	
5 - Waiting times	10 - Appropriateness and acceptability of services	
	11 - Reliability and availability of routinely collected process data	
	12 - Patient use of drugs	
	13 - Patient use of primary and secondary care resources	



MATRICES completion – step 2

Completion of Layer 2 :

- a) Identify all methods used to investigate the effects listed in step 1.

- b) Assign each method a unique letter.

Application to ENIGMA



Layer 2 - Methods	
Code	Method
A	Process data analysis
B	Analysis of SF-36 scores
C	Analysis of EQ-5D scores
D	Analysis of GI Symptom Rating Questionnaire (GSRQ) scores
E	Semi-structured patient interviews
F	Interviews with health professionals and key people
G	Focus groups with health professionals
H	Health economic site visits
I	Health economics patient-reported resource use
J	Innovations questionnaire
K	GP questionnaire
L	Analysis of GI Endoscopy Satisfaction Questionnaire (GESQ) scores
M	Analysis of time taken from referral to procedure



MATRICES completion – step 3

Creation of an alphanumeric code

- a) Link the effects listed in Layer 1 with the method(s) used to investigate them in Layer 2

E.g. patient QoL investigated using SF-36 questionnaire

- b) Write the method codes alongside the effects they investigated

AND

Write the effect code alongside the methods that were used to investigate them

E.g. patient QoL [1] investigated using SF-36 questionnaire [B]



Layer 1 - Effects

Effects on patients	Effects on endoscopy services	Effects on the rest of the NHS 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]	
	10 - Appropriateness and acceptability of services [F, G, K]	
5 - Waiting times [E, M]	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 GI 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 economics patient-reported resource use
J [8]	Innovations questionnaire
K [9, 10]	GP questionnaire
L [4]	Analysis of GI Endoscopy Satisfaction Questionnaire (GESQ) scores
M [5]	Analysis of time taken from referral to procedure



MATRICES completion – step 4

Completion of Layer 3:

- a) List all study findings in each row under the appropriate heading (based on the headings assigned to the effect in Layer 1)
 - *Effects on the **sample population***
 - *Effects on the **specialty** being investigated*
 - *Effects on the **rest of the organisation and society***

- b) Assign each finding at least one alphanumeric code according to the effect(s) investigated and the method(s) used which resulted in that finding.
*E.g. **1B** - patient QoL improved after the intervention*



MATRICES completion – step 5

Refine Layer 3:

- a) All **comparable** findings should be merged into one composite statement with the corresponding alphanumeric codes reported separately alongside the statement.
 - Care should be taken to ensure that the final statement is still representative of the original individual findings.

- b) Where findings are not comparable or even opposing, they should remain separate in Layer 3 but be placed adjacent to each other to make them more visually obvious.

Application to ENIGMA



Layer 3 – Findings	
Code	Finding(s)
<i>Effects on patients</i>	
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).
9F, 10F	There is greater commitment to patient satisfaction and involvement.
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).
<i>Effects on endoscopy services</i>	
10F	Strong leadership, communication, staff ownership important in introducing change
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
8G, 10G	Welsh units see themselves as lagging behind their English counterparts, but are learning from the successes and mistakes.

(Extracts from the ENIGMA main report shown)

- **Finding** – “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 - **3E, 5E, 5M, 8E, 9E, 9F** ”
- **Effects investigated:**
 - **3** = *Patient experience of referral process*
 - **5** = *Waiting times*
 - **8** = *Organisation, function and process of service delivery*
 - **9** = *Accessibility of services*
- **Methods used:**
 - **E** = *Semi-structured patient interviews (Qual)*
 - **F** = *Interviews with health professionals and key people (Qual)*
 - **M** = *Analysis of time taken from referral to procedure (Quant)*



Conclusions

MATRICES allow the user to:

1. Synthesise the common findings of the study
2. Illustrate how they were identified
3. Demonstrate how many facets of the study produced consistent findings
4. Demonstrate how many facets of the study produced inconsistent or opposing findings



Strengths of MATRICS

1. Clarifies which components of the study generate complementary findings.
2. Helps present opposing findings effectively.
3. No meta-analysis of quantitative and/or qualitative data.
4. As quantitative and qualitative results can be synthesised into one summary statement, it **does not inadvertently bias the findings towards one paradigm.**
5. Easy to understand, without requiring readers to study complex figures and tables.



Weaknesses of MATRICS

1. Summary statements may not be sufficient
 - *MATRICS is best used in reports / articles as a summary tool.*
 - *Users may adapt MATRICS to have fuller statements, although this will result in the reduction of synthesisable findings*
2. Reliance upon the user to properly synthesise the findings
 - *At least two people should be involved in completing the MATRICS and all synthesising should be done with mutual agreement*
 - *The users must decide how best to aggregate complementary findings into the recommended summary statements*
3. Not properly tested
 - *Need to apply MATRICS to more studies and adapt the proforma based on comments from users and readers*



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<http://www.sdo.nihr.ac.uk/files/project/46-final-report.pdf>

Interested in using MATRICS for your own study?

Contact WWORTH on wworth@swansea.ac.uk