

A Multicriteria Approach to Patient Classification Systems Evaluation

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The context:

Spanish Public Hospitals financing

Spanish Public Hospitals financing depends on the attended pathologies.

These pathologies are grouped thanks to a Patients Classification System (PCS).

The current classification system is the so-called Diagnostic Related Groups (AP-DRGs based on the International Classification of Diseases ICD-9).

The change from ICD-9 to ICD-10, planned for January 2016, will have, as a consequence among others, the loss of validity of the current Patients Classification System (PCS).




The problem under study

A study is required in order to identify which PCS is more appropriate to substitute the AP-DRG.

We use multicriteria decision aiding to analyze this problem and to propose a possible alternative to AP-DRG.

This analysis will be displayed on a real case over the University's Hospital of Fuenlabrada (Madrid –Spain), affiliated with the University Rey Juan Carlos.

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- ❑ Patients Classifications Systems (PCSs) and why a new PCS is required. 
- ❑ Case study: Hospital de Fuenlabrada (Madrid) 
- ❑ Conclusions and recommendations 



DRGs and AP-DRGs

The current Patients Classification System is the so-called Diagnostic Related Groups (AP-DRGs) developed in the sixties at the University of Yale.

Diagnostic Related Groups, based on the International Classification of Diseases ICD-9, are the fundamental tool to identify the hospital case mix in order to make comparisons and obtain information.

These systems are a health management tool to group patients in clinical meaningful categories with homogeneous resources consumption



From ICD-9 to ICD-10. A new PCS is required.

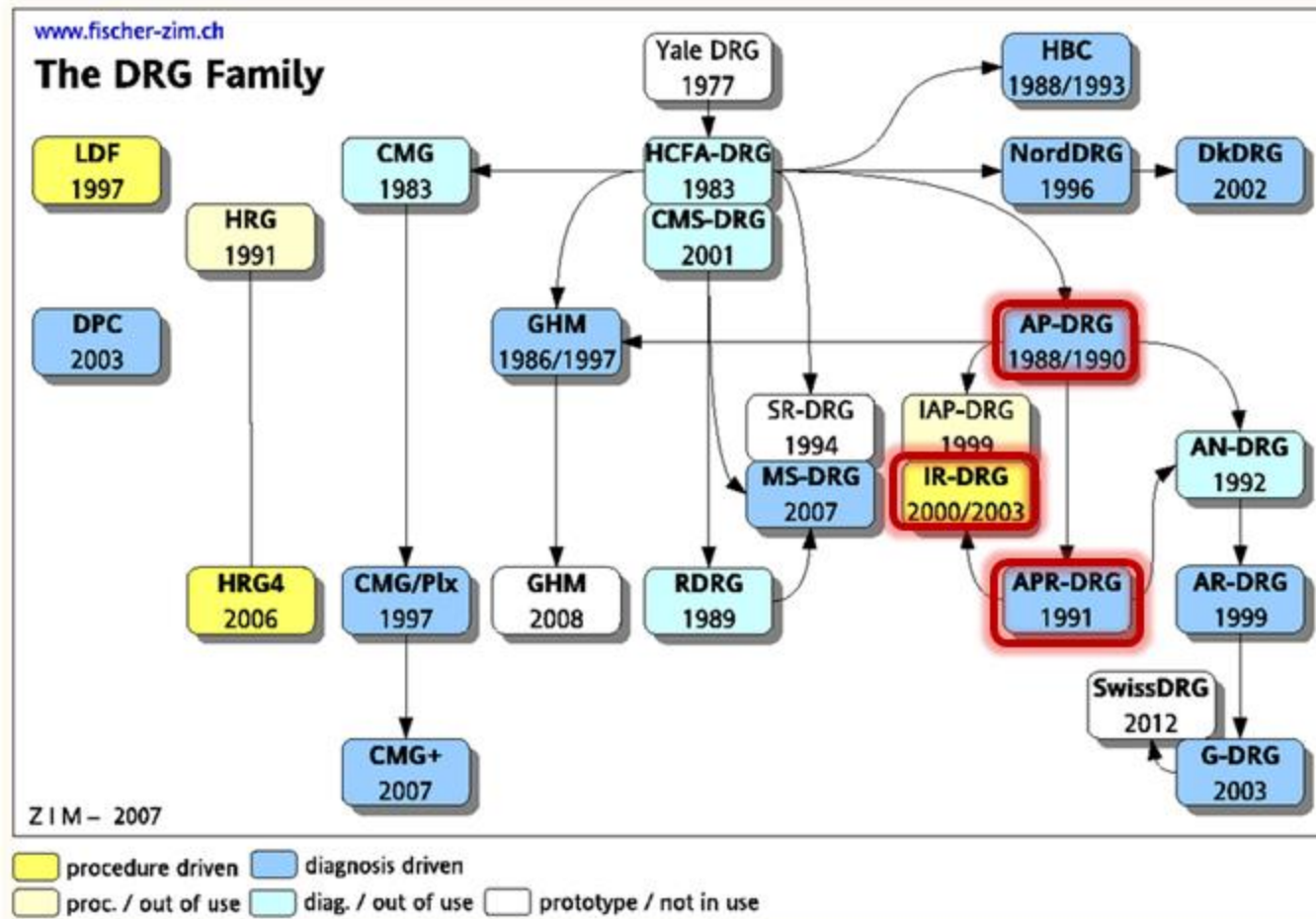
The change from ICD-9 to ICD-10 will have as a consequence the loss of validity of the current Patients Classification System (AP-DRGs).

The two main candidates for the new PCS are:

- International Refined Diagnostic Related Groups (IR-DRG): This system groups all the hospital activities (inpatients and outpatients). It uses the clinical procedure as an axis and adds a grading system for the severity.
- All Patients Refined Diagnostic Related Groups (APR-DRG): It attempts to better explaining the pathology and the resources while expanding (in inpatients) the basic structure of the DRG in subgroups according to the severity and the risk of mortality.



From ICD-9 to ICD-10. A new PCS is required.





Proposed Approach

Objective: Building a ranking of the considered PCs.

Methodology:

a.- Alternatives definition:

- Patients who were a priori grouped under the current DRGs are grouped under the considered alternative DRGs.
- For each patient we have its cost and fare. There are two fares. The one that is currently paid (UCH fare), and the one that would be paid if the new public prices were applied.

b.- Evaluation criteria identification.

c.- Use MCDA to produce recommendations.



Case Study: An Evaluation of Patient Classification Systems at the University Hospital of Fuenlabrada (Madrid –Spain).

Objective: Building a ranking of the PCSs considered.

Data used for the analysis correspond to the period 2009-2013.

Patients who were a priori grouped in AP-DRGs were now grouped in APR-GRDs and IR-GRDs.

For each patient we have its cost and fare. There are two fares. The one that is currently paid (UCH fare), and the one that would be paid if the new public prices were applied.



The multicriteria decision aid problem.

The set of alternatives (Patient Classification Systems)

E1	APRs without severity UCH (Hospital Unit Complexity) fare
E2	APRs without severity Public fare
E3	APRs with severity UCH fare
E4	APRs with severity Public fare
E5	IRs without severity UCH fare
E6	IRs without severity Public fare
E7	IRs with severity UCH fare
E8	IRs with severity Public fare



The multicriteria decision aid problem.

The set of criteria

C1: Underfunded groups	number of groups that are underfunded
C2: Groups in equilibrium	number of groups in equilibrium
C3: Overfunded groups	number of groups that are overfunded
C4: %Underfunded discharges	% of discharges that are underfunded
C5: %discharges in equilibrium	% of discharges that are in equilibrium
<i>C6: %Overfunded discharges</i>	<i>% of discharges that are overfunded</i>
C7: %Underfunded cost	% of cost that is underfunded
C8: %Cost in equilibrium	% of cost that is in equilibrium
<i>C9: % Overfunded cost</i>	<i>% of cost that is overfunded</i>
C10: $B^o/(P^a)$	Profit or loss as the difference between financing and cost



The multicriteria decision aid problem.

The MCDA method: ELECTRE III

The set of parameters:

A sensitivity analysis will be carried out due to the following reasons:

- The difficulties to find out specific values for weights, thresholds and vetoes with the group of experts.
- The necessity of taking into account (to simulate) different situations for political reasons.



The multicriteria decision aid problem.

Sensitivity Analysis

Neither thresholds nor vetoes.
All weights equal to 1

Neither thresholds nor vetoes.

Equilibrium weights 2 times as important as the other ones

Neither thresholds nor vetoes.

Equilibrium weights 3 times as important as the other ones

Neither thresholds nor vetoes.

Imbalance weights 2 times as important as the other ones

Neither thresholds nor vetoes.

Imbalance weights 3 times as important as the other ones

Thresholds and vetoes.
All weights equal to 1

Thresholds and vetoes.

Equilibrium weights 2 times as important as the other ones

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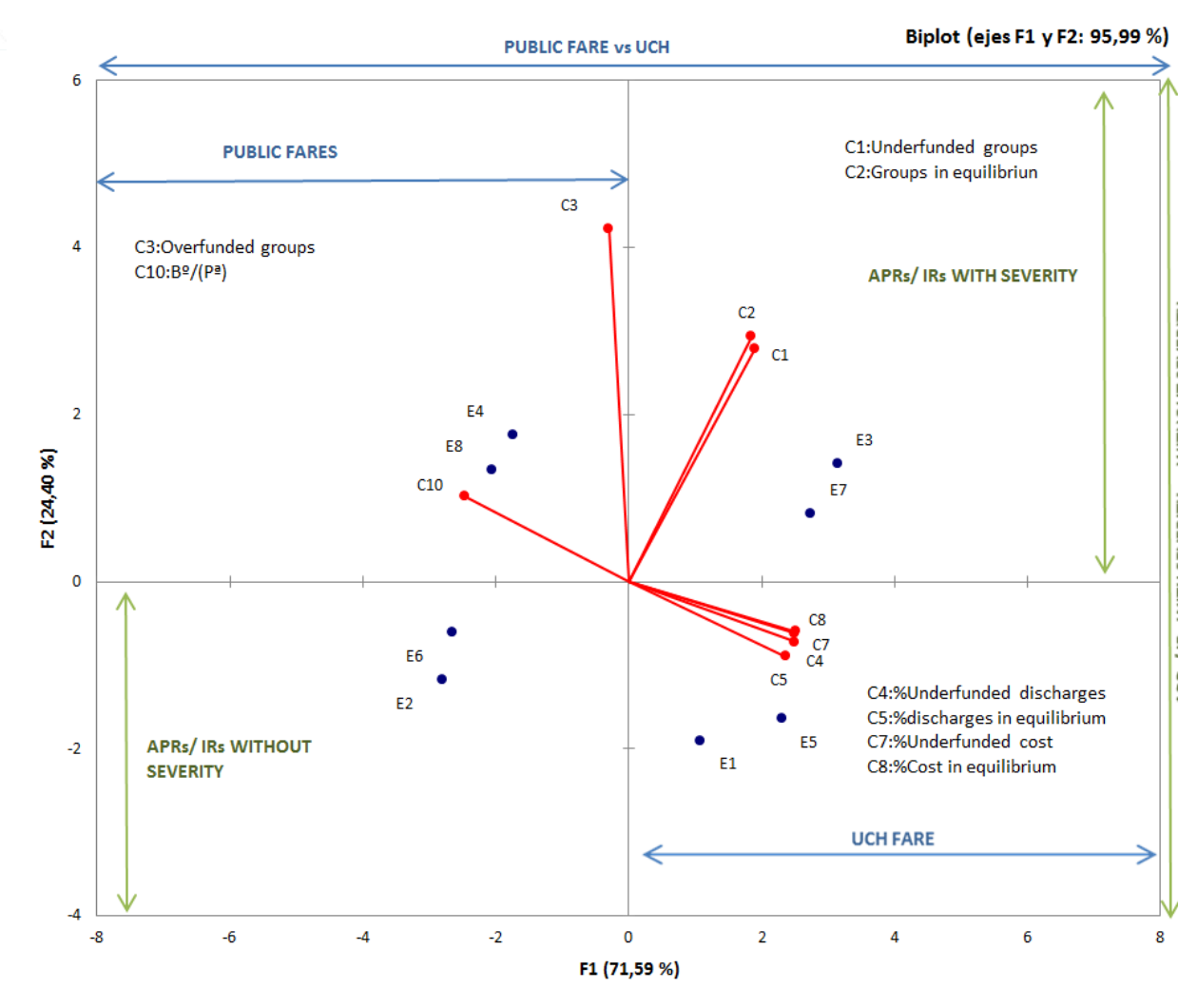


The multicriteria decision aid problem.

		C1	C2	C3	C4	C5	C7	C8	C10
IND.	indif. = 5% (max-mín)	16	3	30	0,01669	0,00504	0,017715	0,00368	4260755,71
PREF.	pref. =20% (max-min)	65	12	123	0,06676	0,02016	0,07086	0,01472	17043022,8
VETO.	veto =50% (max-min)	163	30	308	0,1669	0,0504	0,17715	0,0368	42607557,1

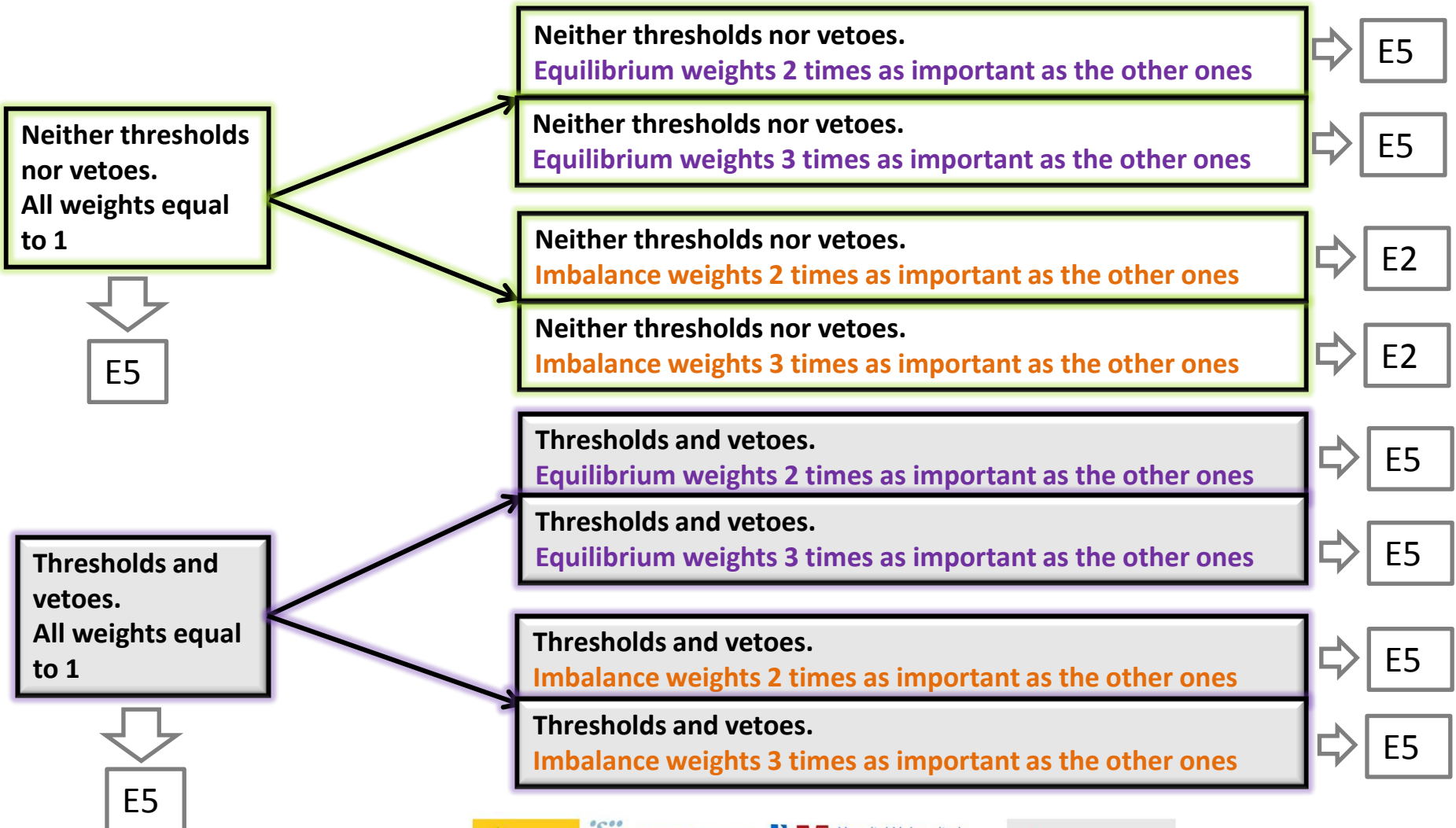


Description of the alternatives vs. criteria





Sensitivity Analysis.



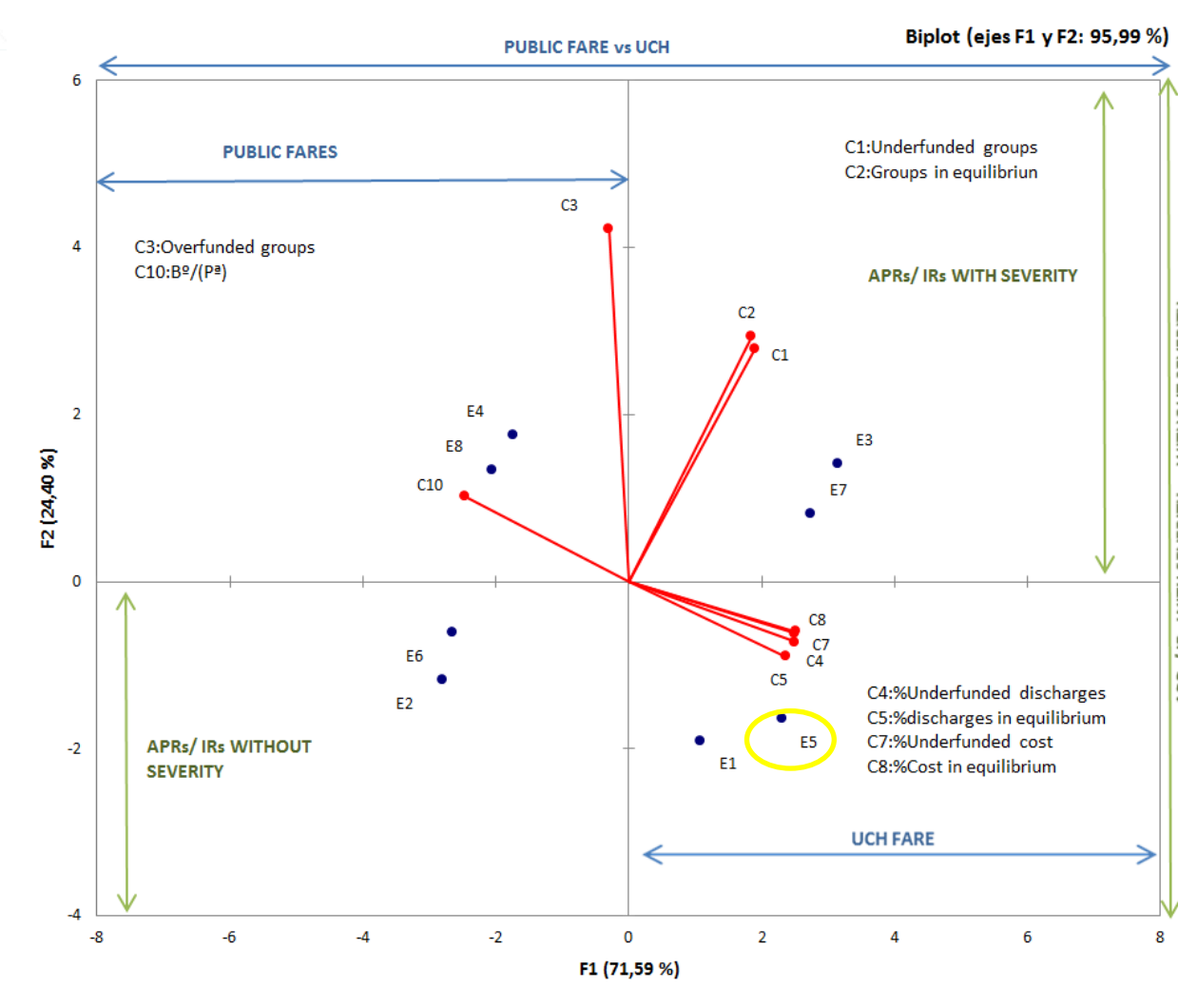
Sensitivity Analysis.



E2	APRs without severity Public fare
E5	IRs without severity UCH fare



Description of the alternatives vs. criteria





Sensitivity Analysis.

Rang	Action	Rang	Action
1	E5	1	E5
2	E1	2	E7
3	E3	3	E1 E3
4	E4	4	E4 E8
5	E2	5	E2
6	E8	6	E6

Equilibrium weights 2 and 3 times more important than the other ones

Rang	Action	Rang	Action
1	E2	1	E2
2	E1	2	E1 E6
3	E5 E6	3	E5
4	E8	4	E4 E8
5	E4 E7	5	E3 E7
6	E3		

Imbalance weights 2 and 3 times more important than the other ones

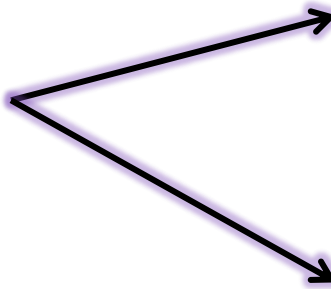
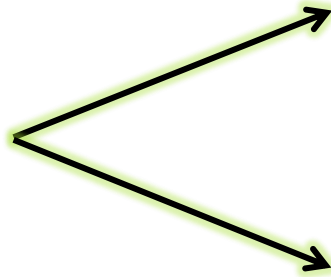
Rang	Action	Rang	Action
1	E5	1	E5
2	E2 E3 E4 E6 E7 E8	2	E2 E3 E4 E6 E7 E8
3	E1	3	E1

Equilibrium weights 2 and 3 times more important than the other ones

Rang	Action	Rang	Action
1	E5	1	E5
2	E2 E3 E4 E6 E7 E8	2	E2 E3 E4 E6 E7 E8
3	E1	3	E1

Imbalance weights 2 and 3 times more important than the other ones

Rang	Action
1	E5
2	E1
3	E2 E7
4	E6 E8
5	E4
6	E3

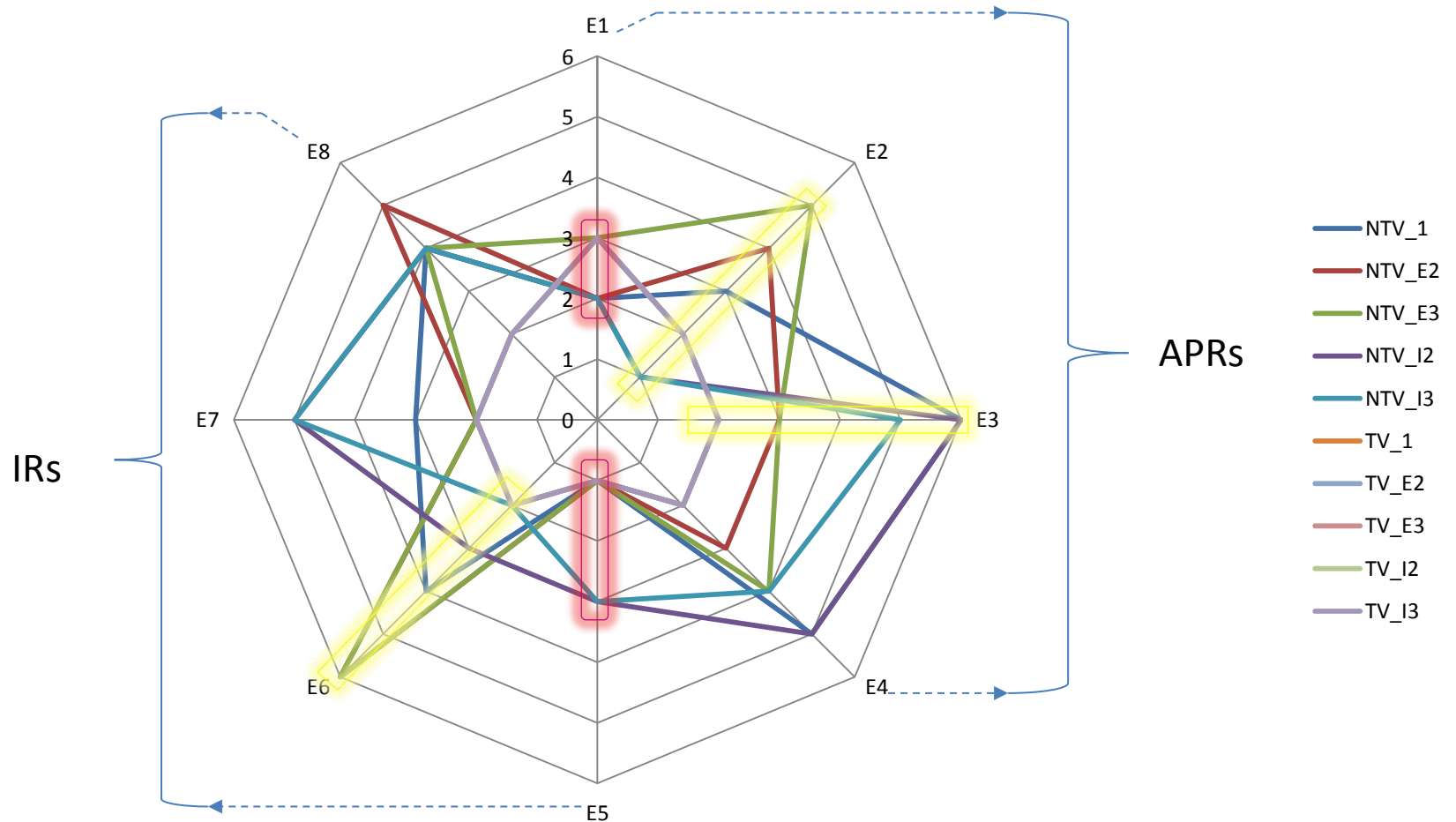


*Neither thresholds nor vetos.
All weights equal to 1*

*Thresholds and vetos.
All weights equal to 1*

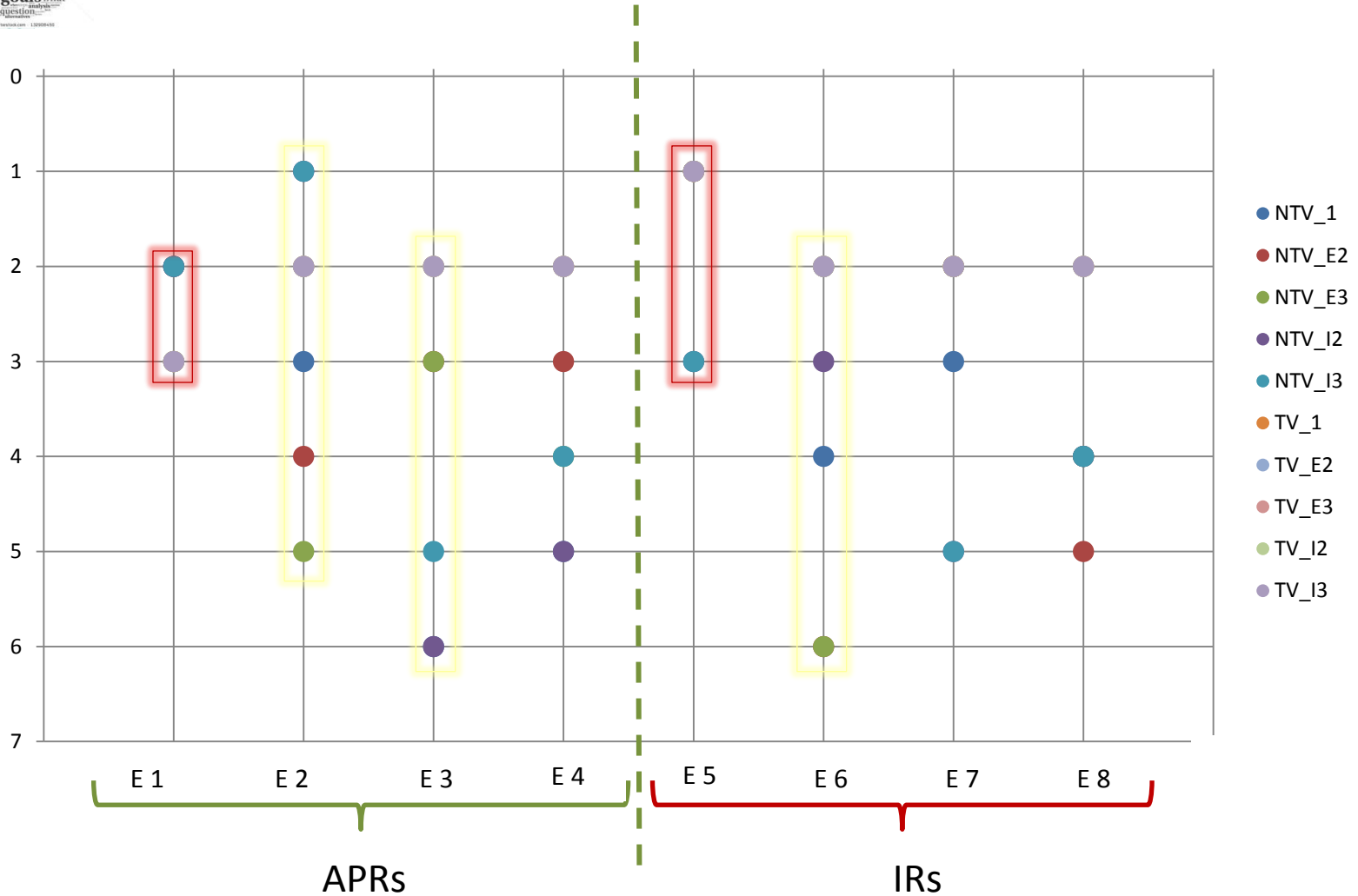


Sensitivity Analysis.





Sensitivity Analysis.





Conclusions and Recommendations.

E5 (IRs without severity UCH fare), seems to be the best possible recommendation.

In relation with the problem of choice between IRs and APRs, the answer is not clear:

- With thresholds and vetoes E5 (IRs without severity UCH fare) and E5 (APRs without severity UCH fare) are, respectively, the best and the worst PCSs. So no clear choice is found.
- Without thresholds and vetoes, first ranks are composed by IRs and APRs in an alternative way.



Conclusions and Recommendations.

Future actions:

- Replicate the study with other hospitals
- Present the results to 3M (the owner company of Patient Classification System's software used by Spanish hospitals). *April 2015*

ANNEXE

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