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EXTENDED ABSTRACT

(Dis)similarities of primary health care indicators, a special case of USF Arte Nova

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Introduction:

Primary Health Care (PHC) are focused on the needs of people and communities and focuses on aspects of physical, mental, social and well-being health, and therefore it is necessary to monitor whether services are being well provided to the community [1,2].

In recent years, PHC have been undergoing a reform that aims to transform it organizationally, allowing greater proximity to communities and better service delivery [3]. In this sense, there has been the implementation of health indicators whose objective is for the health unit team to manage it and improve its worst points according to the results of the indicators. The indicators are divided into 22 Dimensions (e.g., Personalization). Their results are used for the weighted calculation of the Global Performance Index which gives an indication, as the name implies, of the overall performance of that unit [5].

This study aims to explore the indicators to find a possible correlation and proximity between them and to obtain more knowledge about the behavior of the indicators.

Methods:

The statistical analysis was performed using R (version 4.1.3), most of which was presented in shiny app format [4].

The data were collected from the Primary Health Care Identity Card - Contracting, Indicators website [5]. The database is composed of monthly results of 117 indicators for 41 Health Care Units of the Baixo Vouga ACES from 2017 to 2021. The repeated measure correlation between the different indicators with all Units was evaluated (package rmcorr). The correlation between the indicators only with the data of the USF Arte Nova was also performed and, from this point on, the analysis was restricted to this Unit. An exploratory analysis was performed using ggplot2 and scales packages to assess whether the behavior (indicator result over time) of the different indicators of the same dimension was similar, with subsequent consistency analysis of the different dimensions with cls.scatt.data from clv packages. Finally, a hierarchical time series clustering using Shape-based distance (based on coefficient-normalized cross-correlation), with the dtwclust package, was performed for all dimensions.

Results:

The pairs of indicators 2013.035.01 FL/2013.261.01 FL and 2013.006.01 FL/2013.100.01 FL correspond to the two highest positive correlations in both analysis (all Units and only USF Arte Nova). Nevertheless, the correlations of the other pairs of indicators are different between the two approaches. Regarding the 10 highest negative correlations, the scenario observed is already different, the pairs of indicators are very diversified (Table 1).

The most consistent dimensions were "Distribuição de Consultas Presenciais no Dia" (Table 2). There are seven dimensions whose distance is 0 because they only have one indicator associated and the dimensions consisting of only 2 indicators are unsuitable for clustering.

From the cluster analysis, it was found that indeed the consistency of the dimensions influences the results of the cluster analysis. When we analyze the most consistent dimension just from the graphic visualization there are two different behaviors in the indicators, three indicators with very similar behavior and another with an opposite behavior. This ended up also being reflected in the clusters, that is, the clusters formed followed this distinction in behavior visible graphically (Figure 1).

Keywords:
Health indicators, health care unit, association analysis

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Table 1 - Ten highest positive and negative correlations between Health Indicators in all Units and USF Arte Nova data.

Repeated Measures		USF Arte Nova	
Correlation	**Indicators**	**Correlation**	**Indicators**
Positive			
0.9997	2013.035.01 FL/2013.261.01 FL	1.0000	2013.035.01 FL/2013.261.01 FL
0.9841	2013.006.01 FL/2013.100.01 FL	0.9980	2013.006.01 FL/2013.100.01 FL
0.9784	2013.053.01 FL/2018.395.01 FL	0.9940	2013.037.01 FL/2013.100.01 FL
0.9780	2013.047.01 FL/2013.053.01 FL	0.9930	2013.053.01 FL/2013.100.01 FL
0.9650	2013.015.01 FL/2013.296.02 FL	0.9921	2013.006.01 FL/2013.037.01 FL
0.9357	2013.297.01 FL/2018.409.01 FL	0.9902	2013.015.01 FL/2013.296.02 FL
0.9349	2017.352.01 FL/2017.353.01 FL	0.9884	2013.037.01 FL/2013.053.01 FL
0.9318	2013.031.01 FL/2013.063.01 FL	0.9883	2013.023.01 FL/2013.053.01 FL
0.9232	2018.339.01 FL/2018.410.01 FL	0.9875	2013.006.01 FL/2013.053.01 FL
0.9174	2013.017.01 FL/2013.269.01 FL	0.9859	2013.032.01 FL/2013.054.01 FL
Negative			
-0.8423	2013.020.01 FL/2015.314.01 FL	-0.9861	2013.054.01 FL/2013.276.01 FL
-0.8029	2015.314.01 FL/2015.316.01 FL	-0.9853	2013.032.01 FL/2013.276.01 FL
-0.7890	2013.039.01 FL/2015.314.01 FL	-0.9786	2017.346.01 FL/2017.349.01 FL
-0.7754	2013.261.01 FL/2015.314.01 FL	-0.9754	2017.346.01 FL/2017.348.01 FL
-0.7742	2013.035.01 FL/2015.314.01 FL	-0.9674	2017.331.01 FL/2017.346.01 FL
-0.7737	2013.019.01 FL/2015.314.01 FL	-0.9557	2013.015.01 FL/2017.346.01 FL
-0.7487	2013.018.01 FL/2015.314.01 FL	-0.9554	2013.001.01 FL/2013.032.01 FL
-0.7279	2013.037.01 FL/2015.314.01 FL	-0.9534	2013.296.02 FL/2017.346.01 FL
-0.6780	2013.038.01 FL/2015.314.01 FL	-0.9521	2013.001.01 FL/2013.054.01 FL
-0.6577	2013.091.01 FL/2015.314.01 FL	-0.9285	2013.046.01 FL/2017.346.01 FL

Table 2 - Consistency intra Dimensions of USF Arte Nova based on centroids.

Dimension (number os indicators)	**Intra Cluster Distance**
Distribuição das Consultas Presenciais no Dia (4)	0.007029137
Tempos Máximos de Resposta Garantidos (2)	0.007809507
Prescrição MCDT (2)	0.007895714
Personalização (2)	0.009009222
Consulta no Próprio Dia (6)	0.042651585
Prescrição Farmacoterapêutica (9)	0.453415056
Saúde da Mulher (15)	0.573905393
Saúde do Idoso (3)	0.650924029
Saúde do Adulto (12)	0.685108403
Doenças Aparelho Respiratório (2)	0.693297328
Cobertura ou Utilização (7)	0.695591546
Hipertensão Arterial (8)	0.716080569
Saúde Infantil e Juvenil (14)	0.742260558
Diabetes Mellitus (15)	0.788553885
Multimorbilidade e Outros Tipos de Doenças (2)	0.982404119
Acesso (1)	0.000000000
Atividades de Governação Clínica no ACES (1)	0.000000000
Formação da Equipa Multiprofissional (1)	0.000000000
Formação de Internos e Alunos (1)	0.000000000
Programas de Melhoria Contínua de Qualidade e Processos Assistenciais Integrados (1)	0.000000000
Segurança de Utentes (1)	0.000000000
Serviços de Carácter Assistencial (1)	0.000000000

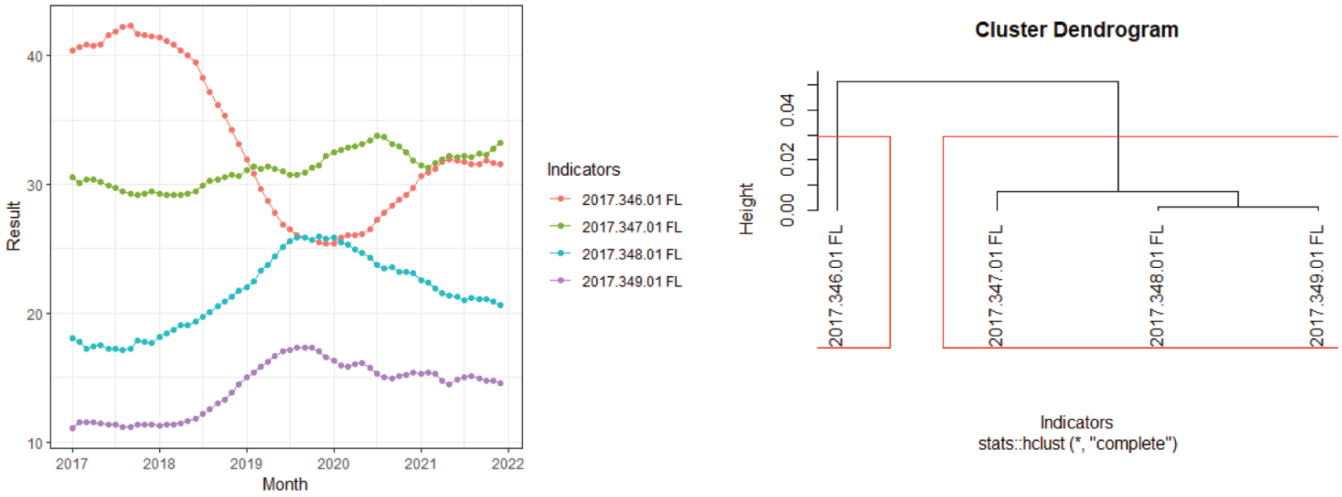

Figure 1 - Visualization of the Indicators of the "Distribuição de Consultas Presenciais no Dia" dimension and respective dendrogram of USF Arte Nova.

Discussion:

The results show that there are pairs of indicators with a clear correlation. This happens, for example, in the first pair of indicators in which both are related to screening or assessment of diabetic foot ulcers, which is expected to be directly proportional. It is not advisable to assume that the correlations obtained only with USF Arte Nova are the same as when using all units (repeated measures). This is explained by the fact that the different types of units have different management and operation.

By the analysis of consistencies and clusters, it is possible to identify groups of similar indicators in some dimensions, while in others this did not prove to be a reality.

The analysis performed allows for more detailed knowledge about the indicators and thus better planning for continuous improvement of the quality of health services. In other words, the more knowledge there is, the better health services can become.

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