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Worlds of Healthcare: A Healthcare System Typology of OECD Countries

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ABSTRACT

In this paper, we present an extended typology of OECD healthcare systems. Our theoretical framework integrates the comparative-institutional perspective of existing classifications with current ideas from the international health policy research debate. We argue that combining these two perspectives provides a more comprehensive picture of modern healthcare systems and takes the past decade's dynamic of reforms into account. Moreover, this approach makes the typology more beneficial in terms of understanding and explaining cross-national variation in population health and health inequalities. Empirically, we combine indicators on supply, public-private mix, and institutional access regulations from earlier typologies with information on primary care orientation and performance management in prevention and quality of care. The results from a series of cluster analyses indicate that at least five distinct types of healthcare systems can be identified. Moreover, we provide quantitative information on the consistency of cluster membership for individual countries via system types.

1. Introduction

Healthcare systems have become more and more complex over the past three decades [1]. As a response to this complexity, healthcare typologies have evolved into an essential tool for comparing the similarities and differences regarding how countries fund, provide, and organize their healthcare. Typologies help researchers, students, and actors in the health policy arena to understand the structures and processes that can be generalized beyond the unique features of each individual healthcare system.

In this article, we present a typology that synthesizes two perspectives on the classification of healthcare systems: (1) a comparative-institutional perspective that conceptualizes healthcare systems as an integral part of welfare states and their different institutional logics [e.g., 18–23] and (2) a health policy research perspective that investigates how care in a field of expanding knowledge, innovation, and complexity is organized and oriented towards healthcare performance [e.g., 5, 27, 28, 30, 31].

Existing classifications of healthcare systems have taken a comparative-institutional perspective that connects them to the broader comparative welfare state literature and its focus on identifying different welfare state regimes [2,3]. These classifications distinguish among healthcare systems based either on the role of different types of actors or on institutional differences in the areas of financing, service provision, and (access) regulation. This line of research has demonstrated that even if healthcare system clusters do not necessarily overlap with welfare state types, the same theoretical concepts can be used for their classification.

However, these classifications have scarcely examined what is distinct about healthcare as a field of welfare production: its complexity and the technical (and to some extent uncertain) nature of diagnosis and treatment. Due to these unique characteristics in healthcare, higher supply and more access do not necessarily lead to good care and improved outcomes [4]. Therefore, the comparative health policy research debate in the last two decades has instead strongly focused on the question of how healthcare can be managed to improve performance and outcomes [5]. Comparative work in this vein has highlighted the cross-national differences in prevention efforts (e.g., [6]), primary care orientation (e.g., [7]), and the management of healthcare processes according to evidence-based guidelines (e.g., [8]). Much of the work in this second debate has been pioneered by work conducted by the OECD and the European Observatory on Health Systems and Policies.

In this article, we propose a synthesized framework of both perspectives. Empirically, we develop an extended typology of OECD healthcare systems by combining indicators from the comparative-institutional perspective on supply, public-private mix, and institutional access regulations with measures on primary care orientation and performance in both prevention and quality of

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care. The results of our cluster analyses indicate that at least five distinct types of healthcare systems can be identified.

2. Healthcare System Classifications: A Brief History of the Comparative-Institutional Perspective

Typologies of healthcare systems have evolved from early attempts to better characterize and categorize healthcare systems that do not fit the traditional labels of Bismarckian versus Beveridgean systems to concepts that capture continuity and change and later to typologies used for analyzing healthcare system effects such as healthcare utilization, health inequalities, and the perception of healthcare systems (see overviews by [9,10]). At the same time, typologies have evolved from once having a strong focus on actors to now focusing on concepts centered around the institutional settings of healthcare systems. These versions of healthcare system typologies are informed by institutional theory through both an interest in institutional change [11,12] and an interest in how particular institutional settings of healthcare systems can be related to outcomes such as health and health inequalities [13].

Since Esping-Andersen's [3] seminal study "Three Worlds of Welfare Capitalism," there has been a discussion regarding whether such versions of typologies correspond with the Weberian concept of ideal types. While we do not wish to enter this theoretical debate, our perspective on the "ideal-type" versus the "real-type" question is as follows: We construct types of healthcare systems on the basis of a theory-guided preselection of relevant indicators. Since these types are contrasted on the basis of phenomena that may vary to the extreme, this concept comes close to Max Weber's [14] original considerations. However, the types of systems are constructed based on indicators of OECD healthcare systems and are therefore based on "real-type" indicators. Nevertheless, they are not real-types, either, nor are they taken to the extreme, as has been suggested by Weber; rather, they represent the average country clustered in its respective type. At the same time, these "average country clusters" can be clearly distinguished from each other and can be used to classify and compare existing healthcare systems (real cases), to assess changes over time, and to analyze healthcare system effects.

When returning to the question of how healthcare system typologies have evolved, we see that the earliest versions go back to the 1970s with Field [15], who used the two main dimensions of "ownership" and "doctors' autonomy" to distinguish four types of healthcare systems: a Pluralist health system in which there is high private provision and the medical profession has high autonomy, a Health insurance system in which social insurance actors play a strong role and the medical profession has high autonomy, a Health service system in which most facilities of service provision are owned by the state and doctors have high autonomy, and a Socialized health system in which all facilities are owned and controlled by the state. Based on the three dimensions of "coverage," "funding," and "ownership," in an OECD-study Schieber [16] added a National health service model that includes universal coverage, tax financing, and provision in public ownership, a Social insurance model that includes universal coverage, social insurance financing, and provision in public and private ownership, and a Private insurance model that includes private insurance coverage, private insurance financing, and provision in private ownership.

Two different approaches have been developed on the basis of these attempts: One focuses on health policy actors, and the second concentrates more on the institutional settings of healthcare systems. Upon combining the dimensions of "governance," "financing," and "provision" with three different types of actors ("public," "private," and "private non-profit"), Rothgang et al. [17] arrived at 27 possible combinations and labeled three of them ideal-types: a State healthcare system, a Societal healthcare system, and a Private healthcare system [17,18]. When testing which of these 27 types exists in the OECD world, Böhm et al. [19] revealed five healthcare system types: the National health service, the National health insurance, the Social health insurance, the Etatist social health insurance, and the Private health system.

The second category of health system typologies is less focused on the actors involved and instead aims to provide a better understanding of how different institutional settings in the areas of financing, service provision, and regulation interact and – together – form complex types of healthcare systems with different consequences regarding the take-up of healthcare services, health status, and health inequalities. In several conceptual papers, Reibling [20] and Wendt [21,22] amended earlier studies by adding the dimensions of "access regulation," "remuneration of doctors," and more detailed information on "healthcare provision," such as inpatient- and outpatient care and medical technology [20–22].

These typologies center around patients' access to healthcare in order to distinguish types of healthcare systems and have identified 1) a healthcare system type with a high service supply and weak regulation, 2) a healthcare system type with a medium to high supply and strong access regulation, and 3) a healthcare system type with low supply and strong access regulation.

3. Comparing Healthcare Systems from a Health Policy Perspective

Despite its significance regarding social spending and its popularity among the public, healthcare has played only a minor role in the discussion of welfare systems. One reason for this minor role clearly lies in the fact that social services have generally been and remain often excluded from the welfare regime debate [23]. While operationalizing social rights remains more challenging than income-replacement programs, there have been many advances in measuring decommodification and the welfare mix in different social services [20,24]. However, the approximation of benefit levels through spending indicators, human resources, and take-up rates remains unsatisfactory not only because these benefit levels are distorted by levels of need, but especially because the awareness of quality differences has increased [28]. Thus, measuring and securing the quality of social services has become a major concern for policymakers and researchers [25,26].

The health policy community has been a frontrunner in this debate due to the unique characteristics of healthcare, which involves specialized expert knowledge and technology even though diagnoses and (the results of) treatments are to some extent uncertain. Moreover, research has shown that more care does not always lead to better outcomes and that over-diagnosis and -treatment have become important issues in the advanced, industrialized world [4]. This finding has spurred an intense debate on how safety and the quality of care can be managed to improve health system performance [27]. While many challenges remain in measuring and managing performance, there is evidence that vast differences in quality exist both within and across countries and need to be addressed [8,28].

The investigation of the sectoral division of healthcare has been linked to the debate on how to improve health system performance. Several reviews have demonstrated the great potential of primary care in terms of containing costs, improving the quality of care and health outcomes, and reducing inequalities [29,30]. Today, primary care is thus often considered a magic formula for many of the current challenges facing healthcare systems [31], and a growing number of health policy scholars are concentrating on international comparisons of primary care [7,32–34] and on the role that primary care plays within the overall healthcare system.

Finally, the question of the extent to which healthcare is actually linked to population health outcomes has been central in the health policy community. Prevention – while relatively insignificant in terms of the healthcare budget – is an area with vast potential to improve health outcomes [35]. An international comparison of healthcare systems that aims to provide information on understanding variation in health outcomes thus needs to include countries' prevention efforts. In many countries, regulatory efforts around risk factors such as smoking and alcohol consumption have increased in recent years; however, comparative work suggests that there is still considerable international variation in preventive activities [6].

4. An Integrated Perspective on Healthcare System Comparison

Our aim in this contribution is to integrate both perspectives on healthcare systems to provide a more encompassing classification of healthcare systems. The basis for such an integration is the definition of theoretical dimensions and empirical indicators within these dimensions from both lines of literature. For the comparative-institutional perspective we based our selection on previous work in this research area [9,10] using with some exceptions the indicators from previous typologies [18–22]:

4.1. Supply

One of the dimensions that has received the most attention in comparative analysis of healthcare systems is the level of resources of healthcare systems which we call supply dimension. Moreover, in the absence of comparative data on benefit packages [36], resources can be seen as an approximation of the benefits provided [37]. We operationalize this dimension with two indicators. First, we use current expenditure on healthcare per capita (in US$ of purchasing power parities). Second, we use the number of general practitioners per one thousand inhabitants as a measure of human resources supply. While including further healthcare professions in this dimension would have been desirable, data availability precluded a more extensive coverage of healthcare personnel. We combine a financing and a provision indicator in this dimension because previous work has shown that expenditure does not easily translate into human resources [38] and thus both indicators can supplement each other. We chose per-capita expenditure rather than % of GDP because it better approximates the benefit level available to individuals.

4.2. Public-Private Mix

The second dimension builds on previous typologies for which the role of the state, societal actors, and the market were the primary conceptual tool in the differentiation of healthcare systems [17,19]. We operationalize the public-private mix via three indicators: the share of public health expenditures of the total health expenditure, the share of out-of-pocket payments of the total health expenditure, and the payment of specialists (either fee-for-service or salary). We could not include information on the ownership of facilities, because this information is not available for the selected set of countries. Moreover, differences between public and private ownership have become blurred [39]. Instead, we used another indicator to approximate to what degree a public employer-employee accountability relationship or a market based purchaser-provider relationship exists by looking at the remuneration method in specialist care: A fee-for-service payment of self-employed specialists indicates a higher degree of private provision compared with the provision of specialist care through salaried employees.

4.3. Access Regulation

For this dimension, we build on earlier work that operationalizes social rights in the healthcare system with the regulations that define the conditions under which individuals have access to care [20]. This access regulation was operationalized through a sum of two indicators. The first indicator measures if individuals are required to register with a GP. The second indicator assesses how a person can access specialist care: only with a referral from a GP (most restrictive), without referral but with additional co-payment, or without any restriction. Second, systems regulate access by installing cost-sharing measures for services. Therefore, we also include information on whether systems generally have cost sharing for GP visits. We focus on GP visits because cost sharing here is most regressive potentially restricting access to the first entry point in the care system. Third, since the quality of different providers varies, another important component of access regulation entails whether individuals can choose the specific provider (e.g. GP X vs. GP Y) for their care.

In addition to these well-established dimensions and indicators for healthcare system classifications, our aim was to add new dimensions that grasp key elements of the international health policy research debate. While clearly many dimensions could have been selected from health policy research here, in our perspective the following two dimensions add key aspects for an international comparison of healthcare systems.

4.4. Primary Care Orientation

A large number of studies in the US [31,32,35] and in Europe [33,34,36] have demonstrated both the international variation and the importance of primary care for achieving health policy goals. As low-level entry point and guide through the system, primary care can increase efficiency, equity, and quality of care [30]. For our large sample of OECD countries, we rely on two indicators to measure the primary care orientation of the healthcare system. First, we calculated the ratio of general practitioners to specialists. If the ratio is positive a country has more general practitioners than specialists and vice versa. In addition, we use the share of health expenditure on outpatient care of the total health expenditure as an additional measure for how strong ambulatory care is in the respective country.

4.5. Performance

As outlined in the theory section, there has been an intensive debate in the health policy research community on the necessity to measure and manage performance in the healthcare system. We define this dimension as the extent to which systems attempt to achieve performance goals in the prevention and quality of care. While we would prefer to have measures on regulatory activities, such as smoking regulations [6] or the monitoring of evidence-based procedures, such measures are not available for a large number of countries in a comparable manner. Therefore, we had to rely on actual performance indicators. Prevention is approximated on the basis of indicators on tobacco (% of daily smokers of population aged 15+) and alcohol consumption (in liters by population aged 15+). Both smoking and alcohol are well-known health risks for which effective regulation measures exist [40]. For quality of care, we use a sum index of six indicators from the OECD healthcare quality database: the number of hospital admissions per one hundred thousand population (age-sex standardized rate, 15+ years) for (1) asthma and chronic obstructive pulmonary disease, (2) con-

Table 1
Means, Standard Deviations, Minimums and Maximums of all variables

Variable	Mean	Standard Deviation	Minimum	Maximum
Supply				
Health expenditure per capita in US$, PPP	3848.93	1565.55	1518	8559
Number of GPs per 1,000 inhabitants	0.99	0.51	0	2
Public-Private Mix				
Public health expenditure, % of total expenditure	75.07	8.73	49	85
Private household out-of-pocket expenditure, % of total expenditure	17.75	6.6	7	37
Remuneration of specialists (0 = fee-for-service, 1= salary)	0.38		0	1
Access Regulation				
Access Regulation Index			0	3
Cost Sharing for GP visits	0.59		0	1
Choice restrictions	0.48		0	1
Primary Care Orientation				
Health expenditure on outpatient care, % of total expenditure	27.27	6.6	17	49
Ratio of general practitioners/specialists	0.52	0.31	0	1
Performance				
Daily smokers in % of population aged 15+	19.12	3.78	12	26
Alcohol consumption in liters by population aged 15+	9.57	1.75	6	12
Quality Sum Index	0	0.52	−1	1

gestive heart failure and hypertension, and (3) diabetes, as well as 30-day mortality after hospital admission per one hundred hospital discharges (age-sex standardized rate, 45+ years) for (4) acute myocardial infarction, (5) hemorrhagic stroke, and (6) ischemic stroke which we combined in a quality sum index.

5. Methodology

5.1. Data

Our typology is based on data from 29 OECD countries and includes all OECD members except for Chile, Israel, Latvia, Lithuania, Mexico, and Turkey due to missing data on too many indicators. Data for nine indicators and indices were taken from the OECD Health Data 2016 [41]. We used the average value of the years 2011 to 2014 since not all countries provide data on each specific year. This procedure yields complete data for health expenditure per capita, public health expenditure, and private household out-of-pocket expenditure. In case a country had missing values for 2011-2014 which was the case for some countries for general practitioners per capita, spending on outpatient care, alcohol and tobacco consumption, and system quality indicators one to three, the data were imputed[1] (see Appendix A for a data table).

Indicators and indices on access regulation, cost sharing, choice restrictions, and the remuneration of specialists are based on the coding of information from countries' most recent Health in Transition Report (HiT) provided by the European Observatory on Health Systems and Policies.[2] Although parallel healthcare systems with differing regulations are in place in some countries, the codes refer to the system for the majority of the population. The data refer to the year 2013, yet most HiTs were published before or after this year; thus, we checked the accuracy of the data with health policy experts for each country. To do this, we developed questionnaires in which country experts were able to check, correct, and comment on our data coding. Questionnaires were sent via e-mail between May and November 2016, and we received 47 back, with at least one and a maximum of four from each country. When differences between the original codes based on the HiTs' and experts' codes occurred, the authors discussed and determined the final codes by consulting additional experts and searching for additional reliable data sources.

The initial selection of indicators was based on theoretical considerations with the intention of reaching maximal conceptual validity for the individual dimensions. However, limiting the number of variables is important for deriving meaningful clusters since the multicollinearity of variables creates problems by giving too much weight to certain variables in the analyses [42]. Table 1 presents the descriptive statistics of our thirteen indicators (unstandardized version).

5.2. Methods

Cluster analysis has become the standard method of classification for welfare state- and healthcare systems (e.g., [20,22,43]). This method has the great advantage of being able to systematically take into account the information on a larger set of indicators when assigning cluster membership. However, cluster analysis requires the researcher to make a number of technical decisions, and there are no widely accepted standards or statistical properties that can be used for determining the best solution [44].

Five decisions are critical in cluster analysis: choosing 1) a standardization method for the variables, 2) a clustering method, 3) a (dis-)similarity measure, 4) a linkage method in hierarchical agglomerative clustering, and 5) the number of clusters. First, since the variables used in the analysis commonly have different scales, a standardization of interval-level data is suggested. For instance, in our case, the large range of health expenditure per capita would lead to much larger distances than would variables with a smaller range, which would result in expenditure dominating the cluster solution. While most social science researchers apply z-standardized scales, Milligan and Cooper [42] have argued that standardizing by range can lead to better results. Second, it is possible to choose different clustering methods. Hierarchical agglomerative clustering – which begins by treating each observation as a single cluster and consecutively merges observations until they are all in one cluster – is the most popular one. Partitioning cluster methods such as k-means uses within-cluster variation as a method of forming homogenous clusters. As a starting point, the cases are divided into a predefined number of clusters; then, the cases are reassigned in iterative steps until all observations are as close as possible to the cluster mean. Third, cluster analysis requires that a dis(similarity) measure is chosen, which is used to determine the distance between cases. For metric variables, squared Euclidean distance is the most widely used dissimilarity measure and is also commonly used with mixed-scale data. There is only one dissimilarity coefficient implemented in standard software specifically for mixed-scale types: Gower's dissimilarity index; however, this index has rarely been applied in the social sciences. Fourth, in hierarchical agglomerative cluster analysis, a linkage method needs to be selected. Fifth, it is necessary to determine the number of clusters, which is usually based on stopping rules and the visual inspection of the dendrogram. Large increases in the agglomera-

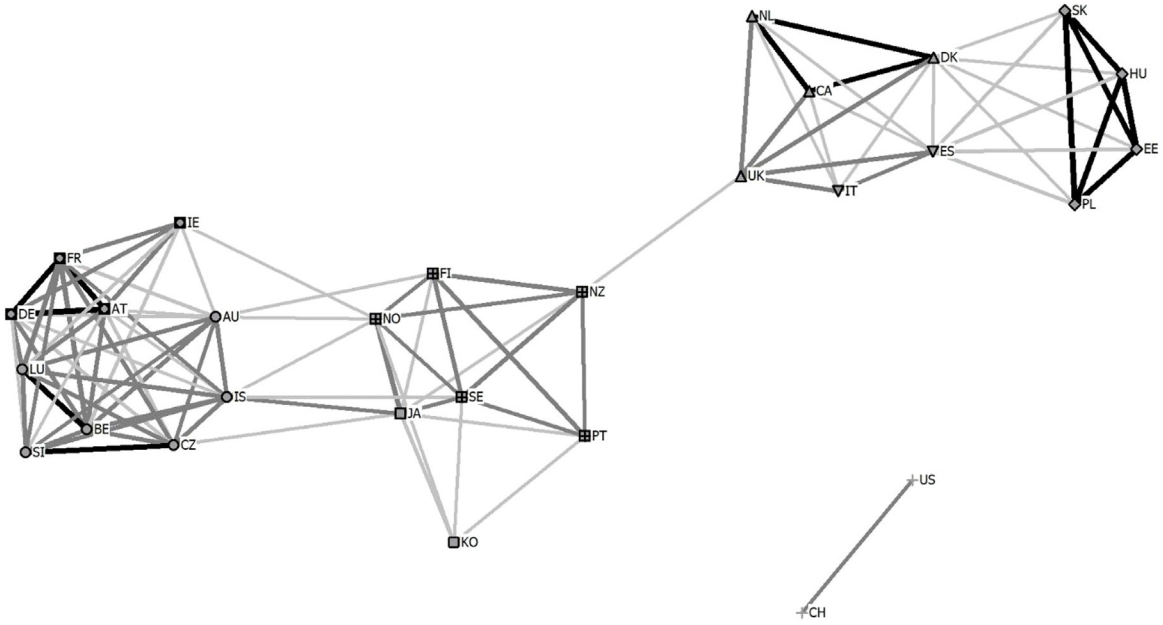

Fig. 1. Network of OECD healthcare systems.

Light grey: ≥50%; Full grey: ≥66%; Black: ≥90%.

tion coefficient signal the fact that very different clusters have been combined, which indicates that this could be a good stopping point for the cluster analysis. Typically, there are several such points, and practical considerations may also apply, such as the fact that two provide too few whereas ten provide too many clusters.

While cluster analysis proves robust regarding the manner in which each of these decisions is made in certain cases, it is more common for different results to evolve depending on how each decision is taken. For instance, decisions generally differ depending on whether the average distance (average linkage) or the shortest distance (single linkage) is used. This finding has led some authors toward a critical perspective of cluster analysis [44]. However, the variation also just reflects the fact that there are different ways of looking at a specific dataset in terms of cluster groupings. Most studies present one or two cluster solutions with a specific set of standardization, clustering method, algorithm, and measure that follow mostly previous work [20,21,43] because "statistical properties of these methods are generally unknown" [44: 406].

In this study, we instead propose conducting a larger number of cluster analyses and using the variability across the results as a measure of confidence about the membership of two observations in one cluster. We thus conducted cluster analyses with (1) both z- and range-standardized variables, (2) Gower and squared Euclidean distance as dissimilarity measures, (3) hierarchical, agglomerative cluster and k-means partitioning analysis, and (4) average and Wards algorithms for hierarchical, agglomerative cluster analysis; moreover, (5) we selected the first- and the second-best result for each analysis as suggested by Calinski-Harabasz and Duda/Hart stopping rule and the dendrogram. The analysis was conducted with Stata/SE version 13.1.

Based on the 24 cluster results, we calculated how often each country is in the same cluster with every other country (measured as a percentage). Results from hierarchical cluster analyses (16) and k-means cluster analyses (8) each go equally into the final result. The resulting network matrix indicates cluster strength. We set benchmarks to account for different degrees of membership in a cluster: full membership (≥66%) and partial membership (≥50%). Fig. 1 depicts the existing clusters and was generated using UCINET 6/Netdraw [45,46].

6. Results

Fig. 1 provides a graphical overview of the clusters that illustrates all links ≥ .5 that exist between these countries across all cluster solutions. The graph highlights the fact that there are distinct groups of countries that can be categorized as types or systems. However, our methodological approach allows us to go beyond this conclusion and reveals which clusters have a higher internal consistency than others as well as which clusters are related to which other clusters and which countries have close relationships to multiple clusters.

If we only group countries together that seem to have a strong link across different methods, we end up with nine clusters, seven of which contain a set of countries, leaving Japan and Korea to form individual clusters. All countries that end up in the same cluster with at least half of the other countries in the cluster in two thirds or more of the cluster solutions are considered to be core members in the cluster (see Table 2). Countries that are clustered together with at least half of the other countries in more than half of the cluster solutions are considered to be partial members in the cluster.

1) *Austria*, *Germany*, *France*, *and Ireland* form the first cluster. Austria, Germany, and France seem to be particularly strongly linked as they end up together in 90-100% of cases. *Belgium* and *Luxembourg* also have full membership in this cluster; however, since they are more strongly associated with the countries in the next cluster, they were excluded here.
2) *Australia*, the *Czech Republic*, *Iceland*, *Slovenia*, *Belgium*, and *Luxembourg* form a second cluster; however, not all of these countries are as consistently linked as in the previous cluster. There is a strong link between the Czech Republic and Slovenia (which end up in the same cluster 90% of the time) as well as between Belgium and Luxembourg (which always end up in the same cluster). France also has a close relationship with this cluster (mainly through Belgium and Luxembourg) but ends up more consistently with Austria, Germany, and Ireland than with the remaining countries of Cluster Two.
3) The third cluster consists of *Finland*, *Norway*, *New Zealand*, *Portugal*, and *Sweden*. The consistency of this cluster is lower

Table 2
Clustering based on benchmark percentages of same cluster solutions

	Cluster								
	1	2	3	4	5	6	7	8	9
≥0,66 and ≥ 0.5 cluster ties	AT DE IE FR *(BE)* *(LU)*	AU CZ IS SI BE LU *(FR)*	FI NO NZ PT SE	CA DK NL UK	ES IT *(UK)*	EE HU PL SK	CH US	JA	KO
≥0,5 and ≥0,5 cluster ties	AU CZ IS SI	AT DE IE	JA KO	ES IT	CA DK NL				
strongest tie in the full cluster	BE_LU_1.0 AT_DE_ 1.0	BE_LU_1.0	NZ_FI _0.84 NZ_SE_0.84	CA_NL_0.97	ES_IT _0.69 UK_ES_0.72 UK_IT _0.72	all ties 1.0	CH_US_ 0.66		
ties ≥ 0,9	LU_BE AT_DE DE_FR FR_AT	LU_BE CZ_SI		CA_NL NL_DK DK_CA		all			
# of ties in the full cluster	6/6 15/15 (100%)	15/15 21/21 (100%)	9/10 (90%)	6/6 (100%)	1/1 3/3 (100%)	6/6 (100%)	1/1 (100%)		
# of ties in the full and partial cluster	42/45 (93%)	42/45 (93%)	18/21 (86%)	15/15 (100%)	15/15 (100%)	6/6 (100%)	1/1 (100%)		

than in the previous clusters as the strongest tie and ties ≥ .9 suggest. The strongest ties in this cluster exist between New Zealand and Finland (84%) as well as between New Zealand and Sweden (84%). Japan and Korea have a partial membership in this cluster as they end up in the same cluster with at least half of the five core member countries in more than half of the cases.

4) *Canada*, *Denmark*, the *Netherlands*, and the *United Kingdom* form a fourth cluster. The first three countries seem to be particularly consistently linked, and all three countries end up in the same cluster solution in 90-100% of the cases. The *United Kingdom* also often lands with these three countries in the same cluster but also has strong ties with the following cluster.
5) *Spain* and *Italy* form a less consistent cluster. As with Clusters One and Two, there are many links between Clusters Four and Five, with all countries being either full or partial members in both clusters.
6) *Estonia*, *Hungary*, *Poland*, and *Slovakia* form a highly consistent and distinct cluster. These four countries end up in the same cluster in 100% of the solutions, and no other countries have partial membership in this group.
7) Cluster Seven consists of *Switzerland* and the *United States*. It has the lowest consistency as both countries end up in the same cluster in only 66% of all results. However, they have no full or partial membership in any of the other clusters.
8) *Japan* and 9) *Korea* have no strong tie with any other country but are both partial members of Cluster Four, with Japan being more consistently clustered with this group of countries than Korea.

Fig. 1 and Table 2 provide a differentiated perspective of how consistently certain countries belong together or are separated from each other. A typology consisting of nine clusters with only a small number of countries is not useful for many purposes. Moreover, links between clusters can be identified, which suggests that some of the clusters can be combined. Thus, our condensed version of the typology consists of five clusters (see Table 3).

6.1. The supply- and choice-oriented public systems

The first system is characterized by a medium to high level of financial resources and high level of human resources, which come primarily from public financing. Access to these resources is not strongly regulated, and citizens have free choice among providers. Specialists provide their service on a fee-for-service basis, which potentially also generates induced demand. At the same time, this system has the highest share of general practitioners compared with all other systems. Despite generous supply, this type has a low performance in terms of both prevention and care quality. The majority of countries from this cluster organize their healthcare based on social insurance (Table 4).

6.2. The performance- and primary-care-oriented public systems

The second type of system is also dominated by public financing but spends less money and uses less doctors for healthcare provision. Resources are also much more strongly regulated: Access to specialists is limited by gatekeeping elements, and choice among providers is regulated. Specialists are paid a salary. The focus of this type of system is clearly on its primary care orientation, with relatively high spending in the outpatient sector and a comparatively high share of primary care doctors compared with specialists. Moreover, this cluster is characterized by high performance in prevention (particularly regarding smoking) and quality of care. The majority of countries that belong to this type are National Health Service countries.

6.3. The regulation-oriented public systems

The third system has similarities with the second type in terms of a medium level of resources that come primarily through public funding. We consider the outstanding feature of this cluster to be its reliance on public regulation. This type has the highest level of access regulation and also limits choice to providers. The system is also characterized by the absence of formalized cost sharing and the lowest level of out-of-pocket expenditures. It has a lower level of primary care orientation than the previous cluster as well as

Table 3
Median values of the variables defining the healthcare system clusters

Cluster composition	1 AU, AT, BE, CZ, DE, FR, IE, IS, LU, SI	2 FI, JA, KO, NO, NZ, PT, SE	3 CA, DK, ES, IT, NL, UK	4 EE, HU, PL, SK	5 CH, US
Cluster size	10	7	6	4	2
Supply					
Health Expenditure per capita	4262.51	3782.84	3964.92	1651.78	7466.73
Number of GPs per population	1.33	0.84	0.85	0.40	0.70
Public-Private Mix					
Public health expenditure, % of total expenditure	77.84	80.00	78.82	72.97	56.79
Private household out-of-pocket expenditure, % of total expenditure	14.10	15.38	13.96	22.83	19.26
Remuneration of specialists (0 = fee-for-service, 1= salary)	0	1	1	0	0
Access Regulation					
Access Regulation (0= none, 3 = maximum regulation)	0.5	2	3	3	0
Cost sharing (0= no cost sharing, 1= maximum cost sharing)	1	1	0	0	1
Choice restrictions (0= none, 1 = maximum restrictions=	0	1	1	0.5	1
Primary Care Orientation					
Health expenditure on outpatient care, % of total expenditure	24.39	29.32	29.37	23.48	39.01
Ratio of general practitioners/specialists	0.63	0.50	0.42	0.19	0.31
Performance					
Tobacco consumption	19.54	16.50	19.43	23.48	17.15
Alcohol consumption	11.15	8.93	9.20	10.74	9.33
Quality Sum Index	−0.06	0.57	0.08	−0.95	0.45

Table 4
Overview of cluster labels and characteristics

	Supply-and choice-oriented public systems AU, AT, BE, CZ, DE, FR, IE, IS, LU, SI	Performance- and primary-care-oriented public systems FI, JA, KO, NO, NZ, PT, SE	Regulation-oriented public systems CA, DK, ES, IT, NL, UK	Low-supply and low performance mixed systems EE, HU, PL, SK	Supply- and performance-oriented private systems CH, US
Supply (expenditures/ doctors)	medhigh/ high	medium/ medium	medium/ medium	low/ low	high/ medium
Public-private mix (public financing/private financing/ fee-for-service)	high/ medium/ FFS	high/ medhigh/ Salary	high/ medium/ Salary	medium/ high/ FFS	low/ medhigh/ FFS
Access regulations (access/ cost sharing/ choice)	low/ yes/no	medium/ yes/ yes	maximum/ no/yes	maximum/ no/some	none/ yes/ yes
Primary care orientation (expenditures/ doctors)	low/ high	medium/ high	medium/ medium	low/ low	high/ medium
Performance (tobacco consumption/alcohol consumption/system quality)	medium/ high/ medlow	low/ medium/ high	medium/ medium/ medhigh	high/ high/ low	medium/ medium/ high

a lower performance in both prevention and quality of care than cluster Two.

6.4. The low-supply and low-performance mixed systems

The fourth system stands out with its low level of resources (both expenditures and doctors). While almost three-quarters of expenditures come from public financing, this type is the leader in out-of-pocket payments for healthcare. This system has strong access and some choice regulations but no institutionalized national cost sharing, which conflicts with the high out-of-pocket expenditures. This type has the lowest primary care orientation of all five clusters, and performance is also lowest in terms of both prevention and quality-of-care indicators.

6.5. The supply- and performance-oriented private systems

Like cluster One, the last system type is characterized by a high supply, which primarily comes from high healthcare expenditures. Due to the strong role of private financing and out-of-pocket expenditure, we have labeled it a private system even though public resources are in the majority. National access regulations do not exist, but private and social insurance plans can have such regulations. More importantly, however, in contrast to other system types cost sharing regulations such as deductibles are used to regulate access to care. This type spends the greatest share on outpatient care and also has a medium GP-to-specialist ratio. The second distinct characteristic is the medium to high level of performance, which distinguishes this type from the Supply- and choice-oriented public system, which is also generous but ends up with mediocre performance.

When we compare the five types of healthcare systems with earlier typologies, we see the following patterns and developments: First, this typology does not fit with the tradition of typologies that have centered on the mode of governance, on the degree of doctors' autonomy, or – more generally – on the actor in order to distinguish healthcare systems (see, for example, [15,17,47]). This typology is clearly based on typologies that distinguish healthcare systems according to their institutional characteristics and patterns of financing and service provision [20–22,48].

When comparing the types of healthcare system identified in this study, there are similarities with the Supply- and choice-oriented public type and the Healthcare-provision-oriented type as well as with the High-supply type suggested by Wendt [21,22]. The Regulation-oriented public system shows analogies with the Universal-coverage–controlled-access type and the Controlled-access type [21,22] as well as with the Strong-gatekeeping- and low-supply type [20]. The three other types (Performance- and primary-care-oriented, Low-supply- and low-performance, and Supply- and performance-oriented) are innovations compared

with earlier typologies partly because of the additional countries and particularly because of the additional dimensions included in our study.

When focusing on the country groupings, the following patterns are of particular relevance: Austria, Belgium, France, Germany, and Luxembourg seem to form a robust cluster, even if the indicators included in the analysis vary. A certain type of Western European social insurance that is institutionalized in these countries with a high degree of doctors' autonomy has resulted in high supply- and choice-oriented systems. A second group of countries that can be identified with different indicators selected for the analysis are Denmark, the Netherlands, Great Britain, Italy [21,22], and Spain [20]. Among other characteristics, these countries share strong gatekeeping and modest supply. The only other typology which includes Estonia, Poland, Hungary, and the Slovak Republic, places these four countries in the same cluster, as well [22], indicating the high similarity of these four healthcare systems. Finally, Finland and Portugal are grouped in the same cluster in all these typologies.

7. Conclusions

In this study, our aim was to provide an updated healthcare system classification based on a theoretical framework that integrates ideas from comparative-institutional welfare state and comparative health policy research. From this framework, we deduced five crucial theoretical dimensions for comparing the healthcare systems of advanced, industrialized nations: supply, public-private mix, access regulations, primary care orientation, and performance. Based on cluster analyses of quantitative and institutional data on 29 OECD countries, we developed a typology of five healthcare systems: the Supply- and choice-oriented public type (AU, AT, BE, CZ, DE, FR, IE, IS, LU, SI), the Performance- and primary-care-oriented public type (FI, JA, KO, NO, NZ, PT, SE), the Regulation-oriented public type (CA, DK, ES, IT, NL, UK), the Low-supply- and low-performance mixed type (EE, HU, PL, SK), and the Supply- and performance-oriented private type (CH, US).

We demonstrated that these five types are distinct and resemble earlier classifications in many ways; however, we also found that types are not as stable or "frozen" as the first contributions of the welfare state modeling business might have suggested [2,49]. Thus, instead of assuming the existence of "frozen" regimes that are built on long path-dependent historical trajectories, system types are in fact the result of institutional stabilities and ongoing policy change: "Any typology of welfare regimes therefore remains valid only as long as history stands still" [50: 73].

Instead of presenting our classification as ironclad regimes, we aimed to provide comprehensive information on the consistency of the clustering and the strength of the relationships that exist between individual countries within the types of systems as well as between the different (sub-)types. Our results can be used for future research in various ways. While our succinct five-type classification might prove useful for certain types of analysis (e.g., for quantitative outcome analysis), researchers might want to use the more detailed information and thus the refined version of the typology for other purposes (e.g., for case selection for qualitative studies).

8. Discussion

This classification is not a test of causal relationships; nevertheless, the clustering of countries and their distinct profile on the underlying dimensions allow to develop hypotheses about causal relationships that underline and extend existing research: While public systems might be cheaper than private systems, they do not outperform them in the prevention or quality of care. The Low-supply- and low-performance mixed system suggests that not all OECD countries currently have sufficient resources for a high-performing healthcare system. However, a comparison of the other types suggests that resources are not related to performance beyond a certain point. As previous research suggests, the dividing line between Social Insurance and National Health Service systems is also of little relevance for other dimensions, such as primary care orientation or performance [51–53]. In fact, all three larger system types include both Bismarckian and Beveridgean countries, which suggests that the hybridization of healthcare systems [54] through the health policy reforms of the past three decades has in many ways fractured old institutional system logics [55].

Our study also has certain limitations. While we have added important dimensions to previous healthcare system classifications, due to data availability and the small number of cases (N = 29), we had to exclude other important aspects of healthcare system comparison from the cluster analyses, including benefit baskets, the use of health information technology, the skill mix of providers, and patient participation [56]. Furthermore, several indicators are only proxies (e.g., tobacco and alcohol consumption for prevention policies, expenditures on outpatient care for primary care orientation), and the measurement error for these indicators limits their comparability. However, we believe that the high-quality sources we used for our data minimized this problem. Cluster analysis is a useful method for deriving classification, but as we discussed at length, it requires many important assumptions and provides no information on the uncertainty of the results in and of itself. We used different methods as well as variation across methods to determine the consistency of the clustering (albeit in a simple calculative manner without underlying stochastic theory).

Despite these limitations, this typology provides a new perspective on the comparison of current healthcare systems that is relevant for both welfare state and health policy research and practice.

9. Notes

1 We used three different imputation methods. First, data were imputed from other sources, such as the Health in Transition reports. Second, data were imputed using interpolation of earlier values. Third, nearest neighbor imputation was used if the two other options were not available.

2 http://www.euro.who.int/en/about-us/partners/observatory/publications/health-system-reviews-hits/full-list-of-country-hits.

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Appendix A. Supplementary data

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