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Accountable Care NEWS

Sharing Success

The German Model: Measuring the Impact of Accountable Care Organizations on Population Health

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Ideally, high-performing health systems will try to achieve the triple aim introduced by the Boston-based Institute of Healthcare Improvement (IHI). The concept consists of a triangle of interdependent aims: improving population health in a cost-efficient way, while enhancing the individual care experience. The triple aim is achieved by an "integrator," who organizes a close collaboration between all stakeholders and actors, such as care providers, professionals or community institutions, schools and sports clubs.[1]

Accountable care organizations (ACO) are predestined to take on this integrator role, thus, their introduction by the Obama Administration in 2010 through the Affordable Care Act. A movement to accountable, integrated care can also be seen in other countries, such as the United Kingdom, Germany and the Netherlands. In Germany, Gesundes Kinzigtal (GKT), one of the country's leading ACOs, is assuming the integrator role while striving towards the triple aim.[2]

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The GKT ACO Experience

In order to examine the impact of triple aim initiatives, IHI proposes a series of outcome indicators[3]; however, limited information—how causal inference can be enhanced and how routinely collected claims data can be used for that purpose—is provided on the evaluation design. Germany's GKT illustrates a robust evaluation design measuring the impact of ACOs on triple aim outcomes by using claims data and highlights the potential impact of ACOs on population health.

GKT, located in a rural area in southwest Germany with a central entity known as the Gesundes Kinzigtal GmbH, was created in 2006, and is jointly owned by a long-established, local physician network and the healthcare management company OptiMedis. A long-term, shared savings contract with two statutory health insurers (SHIs) ensures financial stability that allows for long-term planning and implementation of population health interventions. The scheme covers about half of the region's population—32,595 insurees.

The GKT concept is based on a cross-sectorial cooperation of physicians, hospitals, social care, nursing staff, therapists and pharmacies; the involvement of all stakeholders in the community; and encouraging patients to actively participate in prevention and care.[4]

GKT obtains de-identified, insuree level, master data on out-patient care; hospital stays; pre- and post-stationary services; outpatient surgery; work incapacities; drugs or non-medicinal remedies and aids; prevention; rehabilitation; and long-term, care services from the two cooperating SHIs. From this group, 6,922 enrolled in the ACO from 2006 to 2009, ensuring four years of after-intervention time points for each ACO-enrollee.[5]

Enrollment is voluntary and enables participants to take advantage of special offers from the ACO, such as 20 special GKT health programs, where indicated or when certain requirements are fulfilled.

Ideally, a randomized controlled trial (RCT) would be used with these data to evaluate the impact of GKT on population health because they are the gold standard for examining cause-and-effect relationships; however, in the case of GKT, as well as for most other ACOs, RCTs are not applicable because of the irreversibility of the intervention, its application to the entire population at the same time—and not in different steps—or the lack of sufficient numbers of suitable organizations or regions for the purpose of comparison.

Ethical reasons or costs of RCTs also could be an obstacle.[6] ACOs aim to improve efficiency in comparison to standard care and are not designed as research projects. ACOs with a shared savings contract, such as GKT, must be economically viable for providers and the SHI; thus, complex RCTs are not always a preferred option.[7,8]

Therefore, GKT chose a quasi-experimental approach, using propensity score matching (PSM) in combination with small-scale, exact-matching to control for potential biases because of the non-randomized selection of the intervention and control group. The 6,922 ACO-enrollees, actively enrolled in the years 2006 to 2009, were matched 1:1 with "untreated" pairs (a non-ACO control group), drawn from SHI insurees also living in the region of Kinzigtal.

PSM is based on a logistic regression, which estimates the conditional probability (propensity score) of an insuree being an ACO-enrollee on a scale from 0 to 1, using multiple predictors, such as outpatient and hospital diagnosis, medication data and utilization from a base year (the year preceding ACO enrollment). The calculated propensity score is used to find adequate pairs in a nearest neighbor approach, in combination with small-scale, exact matching, including socio-demographic covariates of age; gender; a person's SHI and insurance status; and the morbidity-related covariate Charlson-score.[9]

PSM is combined with exact matching to find a good balance between an exclusion of a relevant number of cases and/or covariates in the matching process and the potential resulting bias caused by less exact matched pairs (by PSM).[10] Population health is then measured by using a range of claims data-based, mortality indicators: mortality ratio, age at the time of death, years of potential life lost/gained (YPLLG) and survival time. The GKT YPLLG measures potential life years lost (due to premature death) or gained vs. an individual's normal life expectancy.

The analysis allowed for an immortal time bias by differentiating the results of the first year after intervention into two half years in the analysis.

In the GKT intervention, an indirect immortal time bias might occur as GKT physicians usually decide against enrollment of terminally ill patients in the ACO. Addressing such a sick population represents additional stress and little benefit for these patients; thus, patients with a high risk of imminent death are present in the control group but not in the intervention one.

The GKT matching approach resulted in a balanced control of observable differences between the matched intervention (ACO) and control group comprised of a remaining 5,411 insurees. The metric variables, for example, reveal that no standardized difference between the two groups post-matching is bigger than ±10 (an indicator for good matching balance),[11] whereas the standardized difference pre-matching was ± >30 in some variables.

The mortality indicators used indicate positive results (see Table 1). For example, 635.6 fewer years of potential life lost is attributable to the ACO and to control of a potential (indirect) immortal time bias that excluded the first half year after enrollment from the outcome measurement.

	Group						Pearson Chi-square test for YPLLG
	ACO-intervention group (n=5,411)			Non-ACO-control group (n=5,411)			
	Deceased insurees		YPLLG (LE - Age at the time of death)	Deceased insurees		YPLLG (LE - Age at the time of death)	T-test significance * = p<0.05
Time period after enrollment	#	%		#	%		
+1/2 year	15	0.3	-	26	0.5	-	
+1 year (without 1/2 year)	18	0.3	-264.4	31	0.6	-303.1	
+2 years	50	0.9	-415.0	68	1.3	-865.5	*
+3 years	68	1.3	-725.2	76	1.5	-916.8	
+4 years	71	1.4	-601.3	65	1.3	-556.1	
Sum (without 1/2 year)	207	3.8	**-2005.8**	240	4.5	**-2641.4**	*
Difference YPLLG			**-635.6**				
Average age at the time of death		77.5			78.89		

The proposed matching approach is well suited to controlling observable differences between the intervention and control groups caused by the non-randomized group assignment. Claims data offer a good base for population health outcome measurement because of their electronic availability and low collection costs, as well as their comprehensive longitudinal and cross healthcare provider view.

However, while the ACO intervention group and control groups could be balanced on observable variables after matching, unobservable risk factors still could lead to a bias.

For example, there may be a self-selection of health-conscious, sick persons or health-conscious physicians— information that is not available in claims data and therefore cannot be included in the matched pair approach. This and other possible biases must be discussed in the results, while validating the impact of the ACO with supporting evidence through other quantitative and qualitative methods.

In the case of GKT, other studies with different designs, as well as external scientific evaluations, support the results of this paper. Improvements concerning overuse, underuse and misuse of care[12] and respective quality improvements in GKT[13] highlight positive, health-related behavior changes in GKT in the study.

The evaluation approach used in this study may also be applied to other forms of ACOs and integrated delivery models.

In general, long observation periods for the evaluation of such population-based interventions are recommended, as effects from, for example, prevention programs, might reveal an impact only over longer time periods. There may also be a need for more timely feedback to stimulate rapid learning processes. In these cases, additional shorter-term, intermediate outcome measures of population health would be needed in addition to the mortality indicators presented here in this paper.

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