constrained hierarchical clustering on the network constructed from total patient flow between pairs of counties. The results were again compared via modularity on the hold-out set to the county partition. Lastly, we built an individual-based model (IBM) using HCUP and American Hospital Association data to perform epidemic simulations. For each of several counties, we implemented this model to estimate the proportion of patients infected over time. We then reran the individual-based model using the entire state while dividing the results into corresponding counties. **Results:** In total, 680,485 patients transferred between 374 hospitals in 55 counties from 2003 to 2011. The out-of-sample modularity for the edge-betweenness clustering partition was 464% higher than that of the county partition. Aggregating the counties into half as many contiguous clusters was 319% higher, and aggregating them into 6 clusters was 489% higher (Fig. 1). The epicurves from the individual-based model ranged from small to significant deviations between state versus county boundaries (Fig. 2) . **Conclusions:** Collecting network data using externally imposed boundaries may lead to inaccurate network models. For example, counties serve as a poor proxy for their underlying communities, resulting in poor overall disease spread simulation results when county boundaries are allowed to drive network construction. These issues should be considered when building coordination partnerships such as the Accountable Communities for Health.

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Etiology, Incidence, and Risk Factors for Meningitis after Ventriculoperitoneal Shunt Procedures: A Multicenter Study

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Background: The ventriculoperitoneal shunt is the main procedure used for to treat communicating hydrocephalus. Surgical site infection associated with the shunt device is the most common complication and a cause of morbidity and mortality of related to the treatment. We sought to answer 3 questions: (1) What is the risk of meningitis after ventricular shunt operations? (2) What are the risk factors for meningitis? (3) What are the main microorganisms causing meningitis? **Methods:** We conducted a retrospective cohort study of patients undergoing ventricular shunt operations between July 2015 and June 2018 from 12 hospitals at Belo Horizonte, Brazil. Data were gathered by standardized methods defined by the CDC NHSN. Our sample size was 926, and we evaluated 26 preoperative and operative variables by univariate and multivariate analysis. Our outcome variables of interest were meningitis and hospital death. **Results:** In total, 71 cases of meningitis were diagnosed (risk, 7.7%; 95% CI, 6.1%–9.6%). The mortality rate among patients without infection was 10%, whereas hospital mortality of infected patients was 13% ($P = .544$). The 3 main risk factors for meningitis after ventricular shunt were identified by logistic regression model: age <2 years (OR, 3.20; $P < .001$), preoperative hospital stay >4 days (OR, 2.02; $P = .007$) and >1 surgical procedure, in addition to ventricular shunt (OR, 3.23; $P = .043$). Almost 1 of 3 of all patients was <2 years old (290, 31%). Also, 430 patients had >4 preoperative days (46%). Patients aged ≥2 years who underwent surgery 4 days after hospital admission had an increased risk of meningitis, from 4% to 6% ($P = .140$). If a patient <2 years old underwent surgery 4 or more days after hospital admission, the risk of meningitis increased from 9% to 18% ($P = .026$; Fig. 1). We built a risk index using the number of main risk factors based on a logistic regression model (0, 1, 2 or 3; Fig. 2).

Variable	Categories	n	Percent	Meningitis	Risk of meningitis	Relative Risk (RR)	p-value
Age < two years old	Yes	290	31%	40	13.8%	2.83	< 0.001
	No	636	59%	31	4.9%		
More than 3 professionals on surgery	Yes	143	15%	4	2,8%	0,33	0.016
	No	783	85%	67	8,6%		
General anesthesia	Yes	795	90%	64	8.1%	1.69	0.390
	No	84	10%	4	4.8%		
ASA physical status > 2	Yes	300	41%	23	7.7%	0.88	0.683
	No	436	59%	38	8.7%		
Surgical wound: contaminated, dirty or infected	Yes	103	11%	6	5.8%	0.74	0.558
	No	804	89%	63	7.8%		
Duration of surgery > 2 hours	Yes	211	24%	14	6.6%	0.83	0.656
	No	677	76%	54	8.0%		
Emergency surgery	Yes	110	15%	8	7.3%	0.89	0.851
	No	634	85%	52	8.2%		
First hospitalization	Yes	631	68%	65	10.3%	5.06	< 0.001
	No	295	32%	6	2.0%		
More than one surgical procedure	Yes	25	3%	4	16.0%	2.15	0.118
	No	901	97%	67	7.4%		
Preoperative hospital length of stay > 4 days	Yes	430	46%	45	10.5%	2.00	0.004
	No	496	54%	26	5.2%		
NNIS risk index categories	0	186	26%	17	9.1%	1.09	0.761
	1, 2, 3	525	74%	44	8.4%		

Fig. 1.

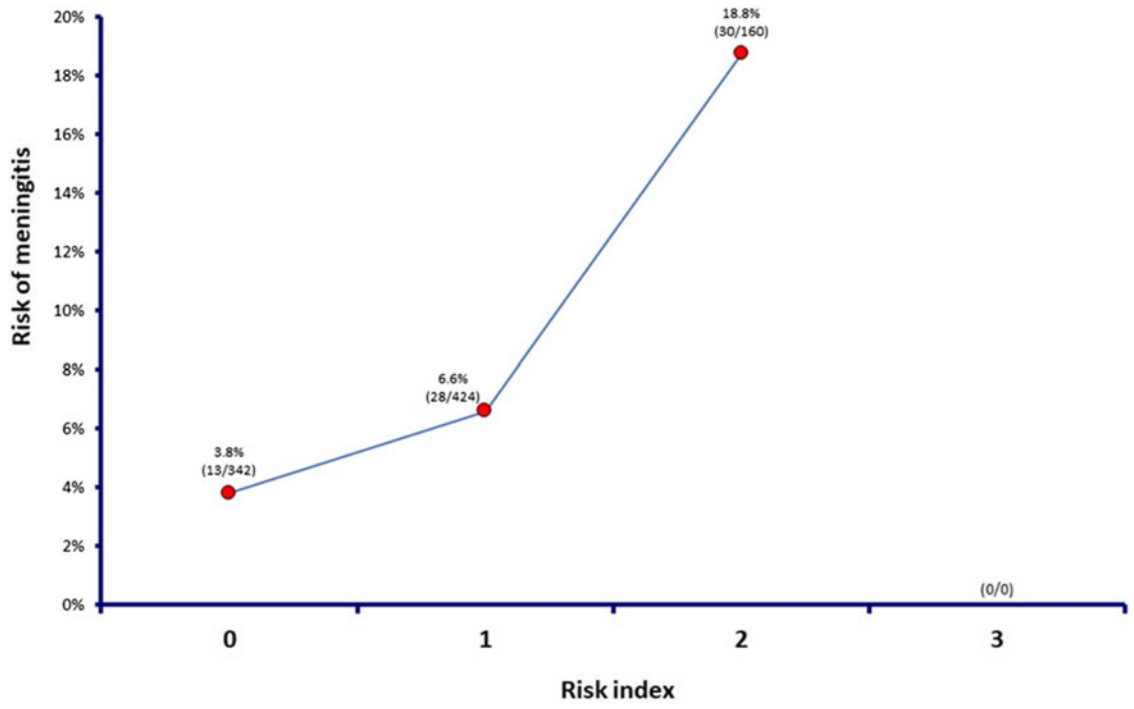

Fig. 2.

Conclusions: We identified 2 intrinsic risk factors for meningitis after ventricular shunt, age <2 years and multiple surgical procedures, and 1 extrinsic risk factor, the preoperative length of hospital stay.
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European Union One Health Country Visits as Driver to Combat on Antimicrobial Resistance

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Background: In 2016, the European Union adopted unanimously Council Conclusions on the next steps to combat antimicrobial resistance under a One Health approach. To implement some of the provisions laid down in the Council Conclusions, a European Joint Action on Antimicrobial Resistance (AMR) and Healthcare-Associated Infections (HCAI) or EU-JAMRAI was set up, gathering 44 partners. **Methods:** As part of EU-JAMRAI, 13 participating European countries set up a country-to-country peer review system to evaluate each other's national action plans (NAPs). This review system entailed a self-assessment, strengths–weaknesses–opportunities–threats (SWOT) analysis, and country visits. All steps were executed with representatives from both the human and the veterinary domains (One Health approach). Special attention was given to supervision and the way supervision can enhance the implementation of guidelines on AMR, both at the policy level and within healthcare institutions. **Results:** Despite differences in the stage of developing and implementing NAPs, all 13 countries are working on NAPs. In this process, country visits function as a moment to exchange best practices and to provide an outsider's point of view. At the end of 2019, 13 country-to-country visits had taken place, resulting in tailor-made recommendations for each country. These recommendations were shared with the competent authority. An example is a country that used the recommendation to improve infection prevention as an immediate reason to get the topic on the agenda of the Ministry of Health. During the country visits, intersectoral participation was perceived as desirable, but in some cases it was challenging to arrange. For some highly relevant topics, it has been recognized that discussion should take place on a European level. Examples of such topics include supervision, infection prevention guidelines, funding, surveillance, and regular audits of antibiotic prescriptions for physicians including feedback loops. **Conclusions:** Peer review is a cooperative and friendly working method compared to common audits. The country visits function as an agenda setting tool to get or to keep AMR on the political agenda and presenting the most relevant topic(s) to address for each country.
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Evaluating Healthcare Worker Movements and Patient Interactions Within ICU Rooms

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