

Do minimum volume regulations for health care interventions improve the quality of care? A systematic review

2nd Conference of International Society for EBHC
October 30th – November 2nd

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Background

- The association between the volume of health care interventions and health care outcomes has been discussed controversially in the literature for more than 30 years.
- Several studies show an association between the volume of health care interventions and health care outcomes.
- It is uncertain whether the determination of a minimum volume for a health care intervention as a regulatory measure leads to better health care outcomes

Objective

- To systematically review the literature on the effects of minimum volume regulations on health care outcomes.

Definitions

Threshold

- A certain volume for a specific health care intervention above which better outcomes relating to relevant quality indicators can be achieved, or
- A certain volume for a specific health care intervention that divides high from low quality providers.

Minimum volume

- Determination of certain number of patients with a particular indication or determination of a minimum volume for a specific health care intervention per provider and year.

Minimum volume regulation

- Determination of a minimum volume for a specific health care intervention as a regulatory measure

Information retrieval

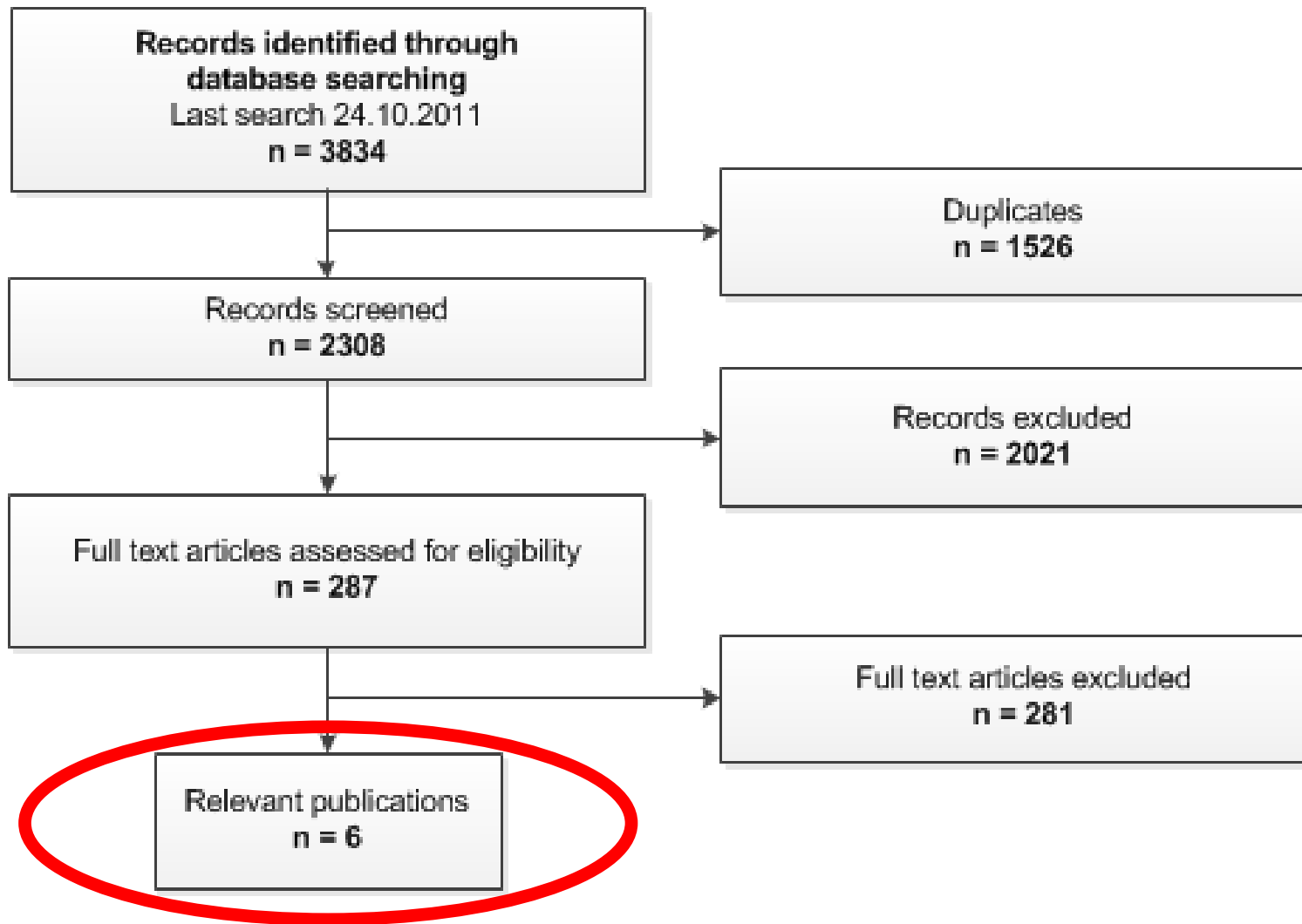
Literature search

- search in MEDLINE, EMBASE and the Cochrane Library
- additionally:
 - search via the “Related Citations” function in MEDLINE and
 - screening of reference lists of included publications

Main inclusion criteria

- study investigates the quality-assuring effects of minimum volume regulations on health care outcomes
- study reports patient-relevant outcomes such as mortality, morbidity and health-related quality of life
- English- or German-language publication
- published after 2000

Results: Information retrieval



Study characteristics

Date of publication		
Between 2007 and 2011		
Country		
Germany: 3 studies	USA: 2 studies	Canada: 1 study
Sector		
Inpatient: all studies	Outpatient: -	
Data source		
Administrative data from hospitals: 3 studies		
Data from quality assurance programs: 3 studies		
Additional hospital survey: 1 study		
Observation period		
Between 3 and 10 years		
Comparison		
Before and after the introduction of a minimum volume regulation: 5 studies	Regional comparison: 1 study	
	Regional + before & after: 1 study	

Procedures, diseases and main outcomes

Author / Country	Procedures / diseases	Main outcomes
Geraedts 2008 / Germany	Total knee replacement (TKR)	Mortality: no Morbidity: yes
Ho 2004 / USA	Percutaneous transluminal coronary angioplasty (PTCA)	Mortality: yes Morbidity: yes
Kostuj 2011 / Germany	Total knee replacement (TKR)	Mortality: yes Morbidity: yes
Masserweh 2011 / USA	Abdominal aortic aneurysm (AAA) repair; oesophageal (OES) and pancreatic (PAN) surgical interventions	Mortality: yes Morbidity: yes
Ohmann 2010 / Germany	Total knee replacement (TKR)	Mortality: no Morbidity: yes
Simunovic 2010 / Canada	Pancreatic (PAN) surgical interventions	Mortality: yes Morbidity: no

Quality of included studies

Study design?		
Retrospective observational study: All studies		
Sufficient presentation of the data in the studies?		
Sufficient: 4 studies	Insufficient: 2 studies	
Adequate statistical model used?		
Yes: all studies	No: -	
Risk adjustment?		
Yes: all studies	No: -	
Consideration of cluster effects?		
Yes: 4 studies	Unclear: 1 study	No: 1 study
Information on model quality?		
Information: 1 study	No information: 5 studies	

Results: Mortality

Author	Procedures	Outcome	Statistically significant results
Ho 2004	PTCA	In-hospital mortality	no significant changes
Kostuj 2011	TKR	In-hospital mortality	no significant changes
Masserweh 2011	AAA repair	30-/90-day mortality	no significant changes
	OES		no significant changes
	PAN		no significant changes
Simunovic 2010	PAN	surgical mortality	significant reduction

AAA repair: abdominal aortic aneurysm repair; OES: oesophageal surgical interventions; PAN: pancreatic surgical interventions; PTCA: percutaneous transluminal coronary angioplasty; TKR: total knee replacement

Results: Morbidity

Author	Procedure	Outcome	Statistically significant results
Geraedts 2008	TKR	Postoperative wound infection	no significant changes
Ho 2004	PTCA	Emergency CABG	[no details provided]
Kostuj 2011	TKR	Wound infection; cardiovascular events	no significant changes
		Pneumonia; thrombosis; pulmonary embolism; vascular and neural lesions	significant reduction
		Fractures; implant malpositioning	significant increase
Ohmann 2010	TKR	Postoperative wound infection; post-operative hematomas / secondary bleeding	significant reduction
Masserweh 2011	AAA repair	30-day complications	significant reduction
	OES	30-day complications	no significant changes
	PAN	30-day complications	significant increase

AAA repair: abdominal aortic aneurysm repair; CABG: coronary artery bypass surgery; OES: oesophageal surgical interventions; PAN: pancreatic surgical interventions; PTCA: percutaneous transluminal coronary angioplasty; TKR: total knee replacement

Results: Health-related quality of life

- None of the included studies considered the outcome “health-related quality of life”.



Conclusions

- The regulation of minimum volumes of health care interventions is being discussed as an option to improve health care outcomes.
 - We identified 6 studies – mostly of low methodological quality – investigating the effects of minimum volume regulations on health care outcomes.
 - The studies showed contradictory effects for the outcomes “mortality” and “morbidity”. None of the included studies considered the outcome “health-related quality of life”.
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- It has been insufficiently investigated whether minimum volume regulations actually lead to an improvement in the quality of health care.
 - Further research is needed to be able to draw robust conclusions on the quality-assuring effects of minimum volume regulations.

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