

# Hospital potentially avoidable readmissions in general internal medicine: elaboration of a predictive score

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## Background & objective

Patients at risk of readmission should be identified early during hospital stay, in order to benefit from specific interventions.

The aim of this study was to :

- ✓ characterize patients readmitted in two Swiss hospitals,
- ✓ include a specific focus on medication profile,
- ✓ create a predictive tool of hospital potentially avoidable readmissions.

## Method

This retrospective study included all patients identified by SQLape algorithm as readmitted within 30 days in 2011 in general medicine wards in HUG and GHOL. Control patients, not identified by SQLape as readmitted, were matched on age and sex.

Factors associated with potentially preventable readmission were identified with a multivariate logistic regression. Variables of interest were demographic data, diagnoses, lab results and medications at discharge. A predictive score was developed using a regression coefficient-based scoring method.

## Results

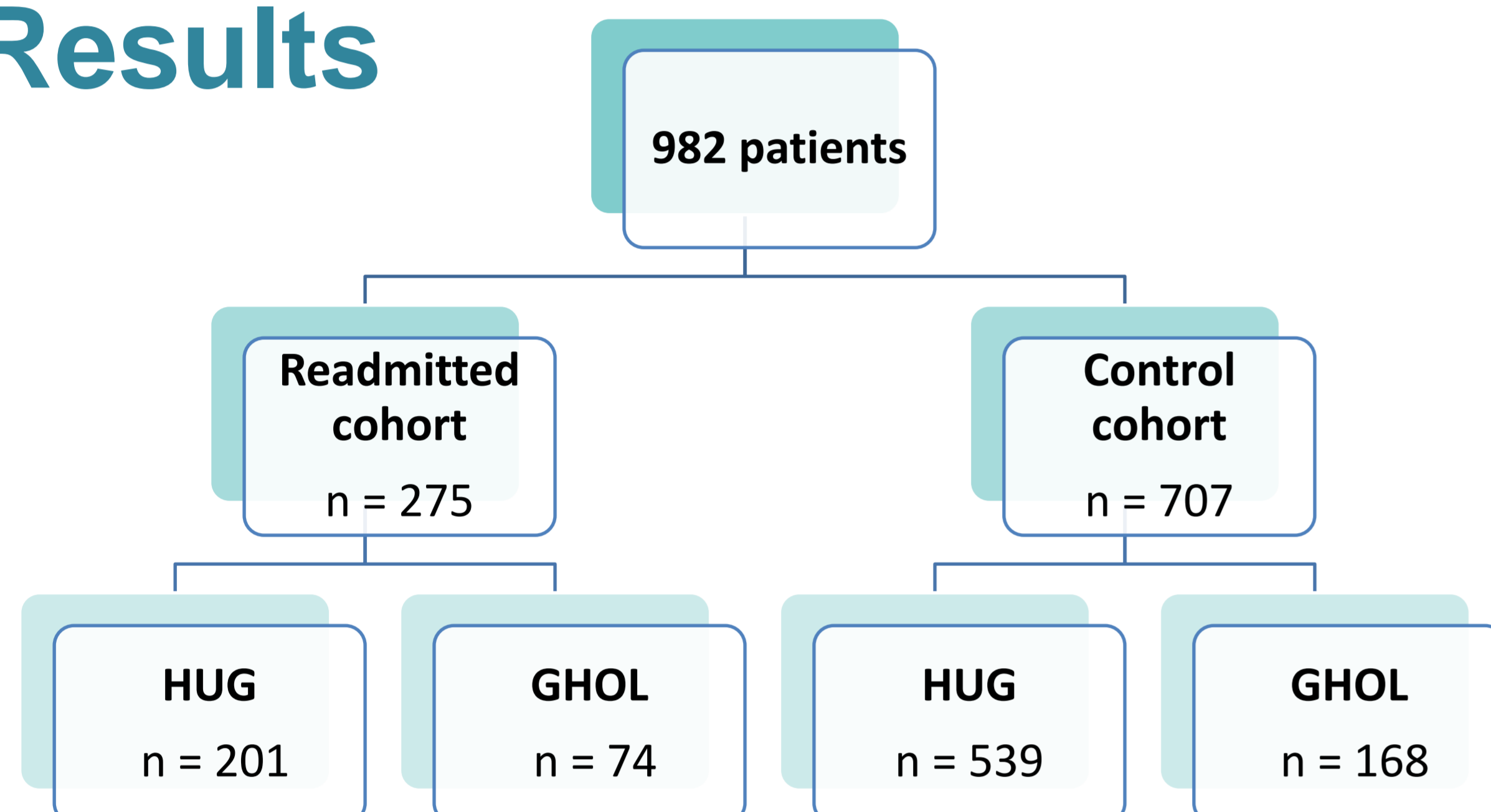


Figure: Study flow chart



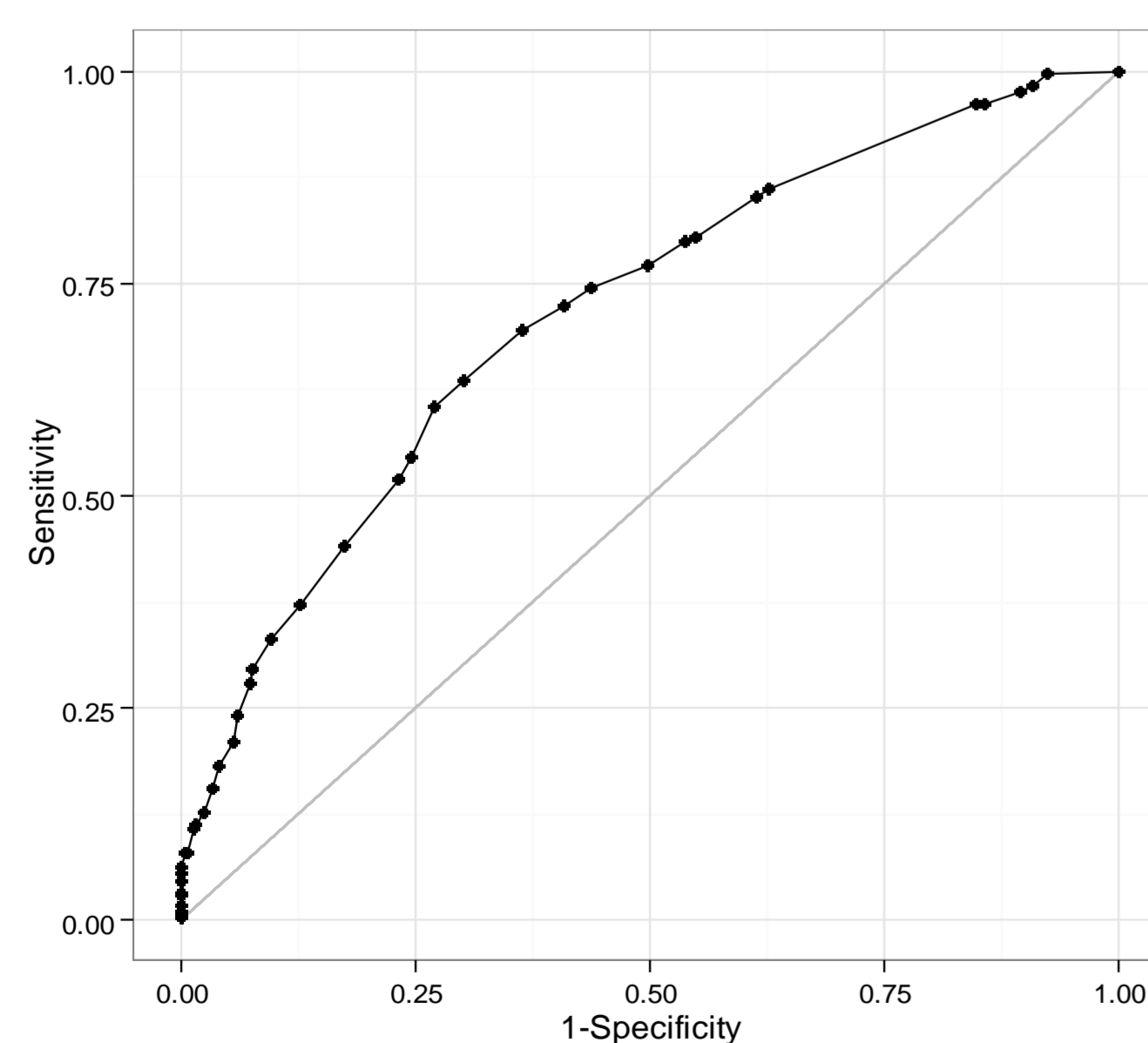
	Multivariate analysis		
	p value	Adjusted OR	95% CI
<b>Demographic risk factors</b>			
<b>Length of stay</b> >7 - 14 d.	<0.01	1.16	0.81 - 1.66
>14d.		2.12	1.35 - 3.33
<b>Previous admission within 6 month</b>	<0.01	2.11	1.53 - 2.90
<b>Comorbidities</b>			
Anemia	0.16	1.28	0.91 - 1.79
Hypertension	0.84	0.96	0.66 - 1.39
Arrhythmias	0.78	1.06	0.70 - 1.58
Liver abnormalities	0.35	1.25	0.78 - 1.98
COPD	0.10	1.48	0.93 - 2.35
Dementia	0.07	1.69	0.95 - 2.98
Diabetes	0.71	1.11	0.64 - 1.91
<b>Heart failure</b>			
Renal impairment : acute	<0.01	2.14	1.38 - 3.33
chronic	0.24	0.82	0.47 - 1.39
acute on chronic		1.24	0.80 - 1.90
		0.70	0.40 - 1.18
<b>Malignancy tumor</b>	<b>0.04</b>	1.45	1.01 - 2.06
<b>Myocardial infarction or ischemic cardiopathy</b>	<b>0.02</b>	1.73	1.09 - 2.75
<b>Laboratory results</b>			
<b>Hyperkalemia [K &gt;5.5mmol/L]</b>	<b>0.01</b>	2.56	1.24 - 5.41
Hyponatremia [Na > 145mmol/L]	0.26	1.55	0.72 - 3.27
INR > 3.5 with AVK drugs	0.86	1.07	0.51 - 2.17
<b>Medication risk factors</b>			
Anti-platelet drugs	0.48	0.83	0.50 - 1.38
Anticoagulant	0.73	1.08	0.71 - 1.64
Beta-blockers	0.87	1.04	0.69 - 1.56
Benzodiazepine	0.13	1.30	0.93 - 1.83
Diuretics	0.59	0.88	0.56 - 1.40
Glucose lowering drugs (insuline/sulfonylurea/gliinide)	0.55	1.20	0.66 - 2.22
Other antidiabetic drugs	0.28	0.69	0.35 - 1.34
Opioids	0.38	1.18	0.81 - 1.73
<b>ACE inh. / angiotensin II antagn.</b>	<0.01	0.51	0.34 - 0.77
Nb of severe drug-drug interactions : 1	0.55	1.27	0.74 - 2.15
2		1.27	0.68 - 2.37
≥ 3		1.59	0.80 - 3.14
Nb of risk classes : 2	0.53	0.97	0.59 - 1.60
3		0.70	0.38 - 1.28
≥4		0.80	0.35 - 1.82

### HIPPOCCRAS Score

Characteristics	Points
Heart failure	7
Myocardial Infarction or Ischemic cardiopathy	5
Previous admission within six months	8
Potassium >5.5 mmol/L	9
Oncological comorbidities	4
COPD*	5
Cognitive comorbidities*	5
RAA Drugs : ACE inh/Angiotensin II antag.	-7
Anemia*	2
Length of Stay > 14 days	7

\* Non significant but predictive covariates

### Discrimination power



**C-statistic :**  
Score : AUC = **0.714** (95%CI 0.680-0.749)

## Limitations

- Retrospective study
- Only two hospital involved in the study
- Potentially avoidable readmission defined by SQLape algorithm
- Patient transferred to long term care and patients readmitted outside GHOL and HUG : not included

## Conclusion

This retrospective study identified several factors significantly associated with potentially avoidable readmissions and routinely available during hospital stay. Based on these results, a predictive score has been developed and an internal validation will be performed in order to confirm these results.

