

**A** Acute  
**M** Myocardial  
**I** Infarction in  
**S** Switzerland

**University of Zurich**

Institute of Social and  
Preventive Medicine



# AMIS Plus Registry

Acute Myocardial Infarction in Switzerland

## Status of the project

Dragana Radovanovic

March 5, 2009

# Status of the project - March 2009

- Some more AMIS Plus figures
- How are the data collected?
- What do hospitals gain?
- Database status
- Achievements



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D. Radovanovic, Berne, 5 March 2009



# Since 1997....

- 76 Swiss hospitals have taken part
- More than 600 doctors have entered data
- Data Center moved twice



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# Since 1997....

- 12 employees
- AMIS Plus questionnaire revised 12 times
- Number of variables were extended from 115 to > 180
- 4 IT data entry system changes



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# Since 1997.....

- 5 reports
- 28 newsletters
- Hundreds of data analyses
- Collaborated with
  - Quality Assessment Organisations
  - Swiss Heart Foundation
  - Federal Office of Public Health
  - Federal Office of Statistics



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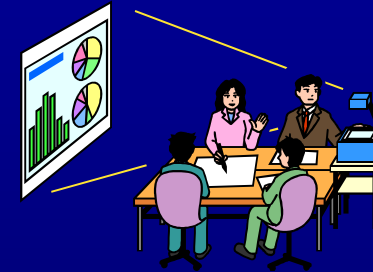
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# Since 1997.....

- Meetings

- Steering Committee 23x



- Participants' and Sponsors' 4x



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# AMIS Plus Project

- Where are we today?

5<sup>th</sup> March 2009

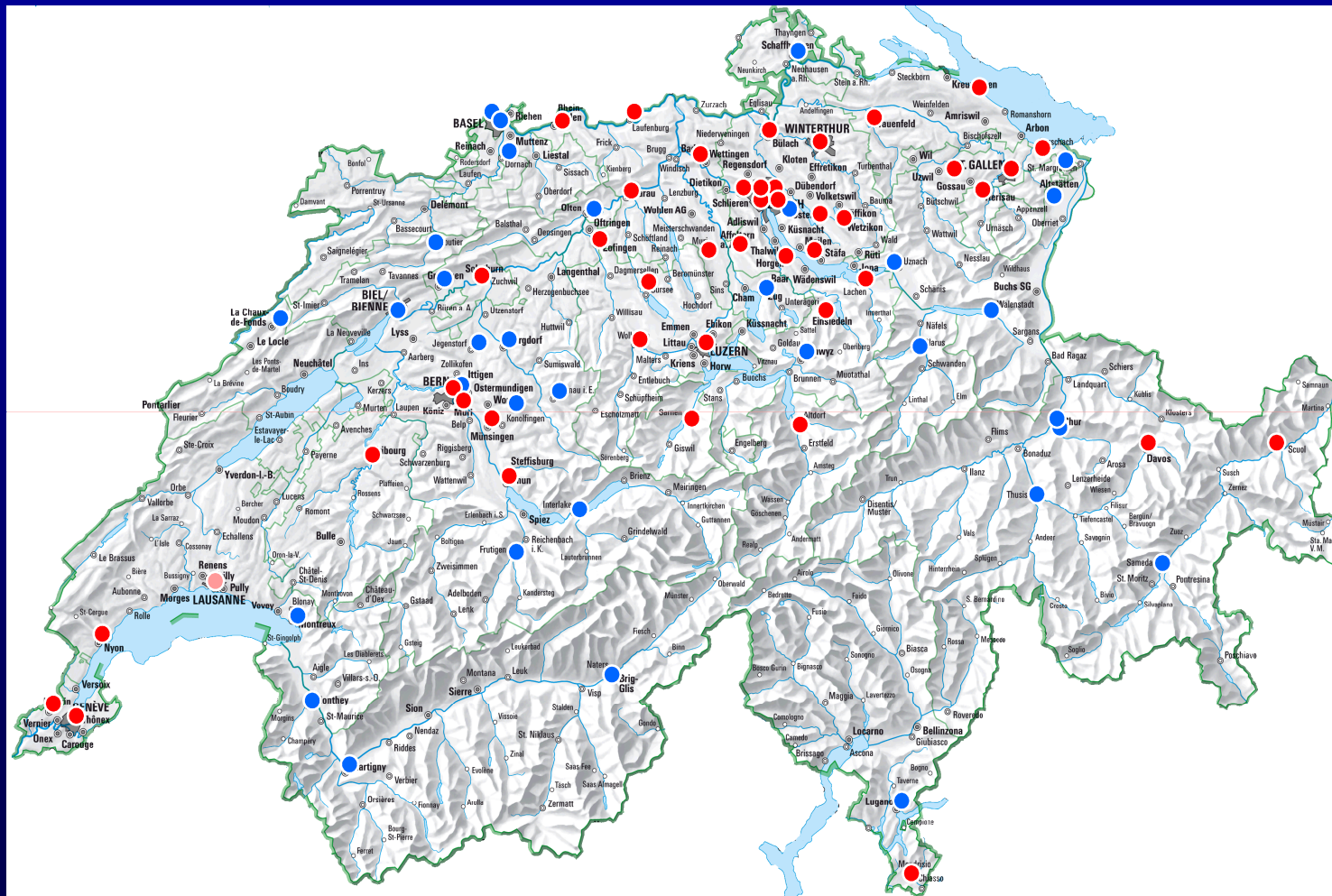


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# AMIS Plus Participants



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# AMIS Plus Questionnaire

	University of Zurich Institute of Social- and Preventive-Medicine	<b>AMIS-Plus-Questionnaire</b> <small>0803</small>		<b>A M I S</b> Acute Myocardial- Infarction-in Switzerland
---	---	---	---	--

AMIS-Data-entry-identification	
Hospital	[...][...][...][...]
Patient-ID-number	[...][...][...][...][...][...][...][...][...][...][...][...]
Physician-ID	[...][...][...][...][...][...][...][...]
Date-of-data-entry	Day: [...][...][...] · Month: [...][...] · Year: [...][...][...][...]

PATIENT-AT-ADMISSION	
Date-of-birth	Day: [...][...][...] · Month: [...][...] · Year: [...][...][...][...]
Gender	<input type="radio"/> Male ···· <input type="radio"/> Female
Weight (eg: 68.5 kg is rounded up to 0 6 9 kg)	[...][...][...] · kg
Height	[...][...][...] · cm
Admission-date	Day: [...][...][...] · Month: [...][...] · Year: [...][...][...][...]
Admission-time	hh: [...][...] · mm: [...][...]
Basic-insurance-coverage	<input type="radio"/> Yes ··· <input type="radio"/> No
Transfer (was the patient transferred from another hospital?)	<input type="radio"/> Yes ··· <input type="radio"/> No <b>IF-YES →</b> Hospital name? <span style="border: 1px solid gray; padding: 2px;">Ganzer Bildschirm</span>
<span style="border: 1px solid gray; padding: 2px;">Ganzer Bildschirm schließen</span>	
» Condition	
Symptoms-at-admission	
• Pain	<input type="radio"/> Yes ··· <input type="radio"/> No ··· <input type="radio"/> Unknown
• Dyspnea	<input type="radio"/> Yes ··· <input type="radio"/> No ··· <input type="radio"/> Unknown



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# AMIS Plus Questionnaire

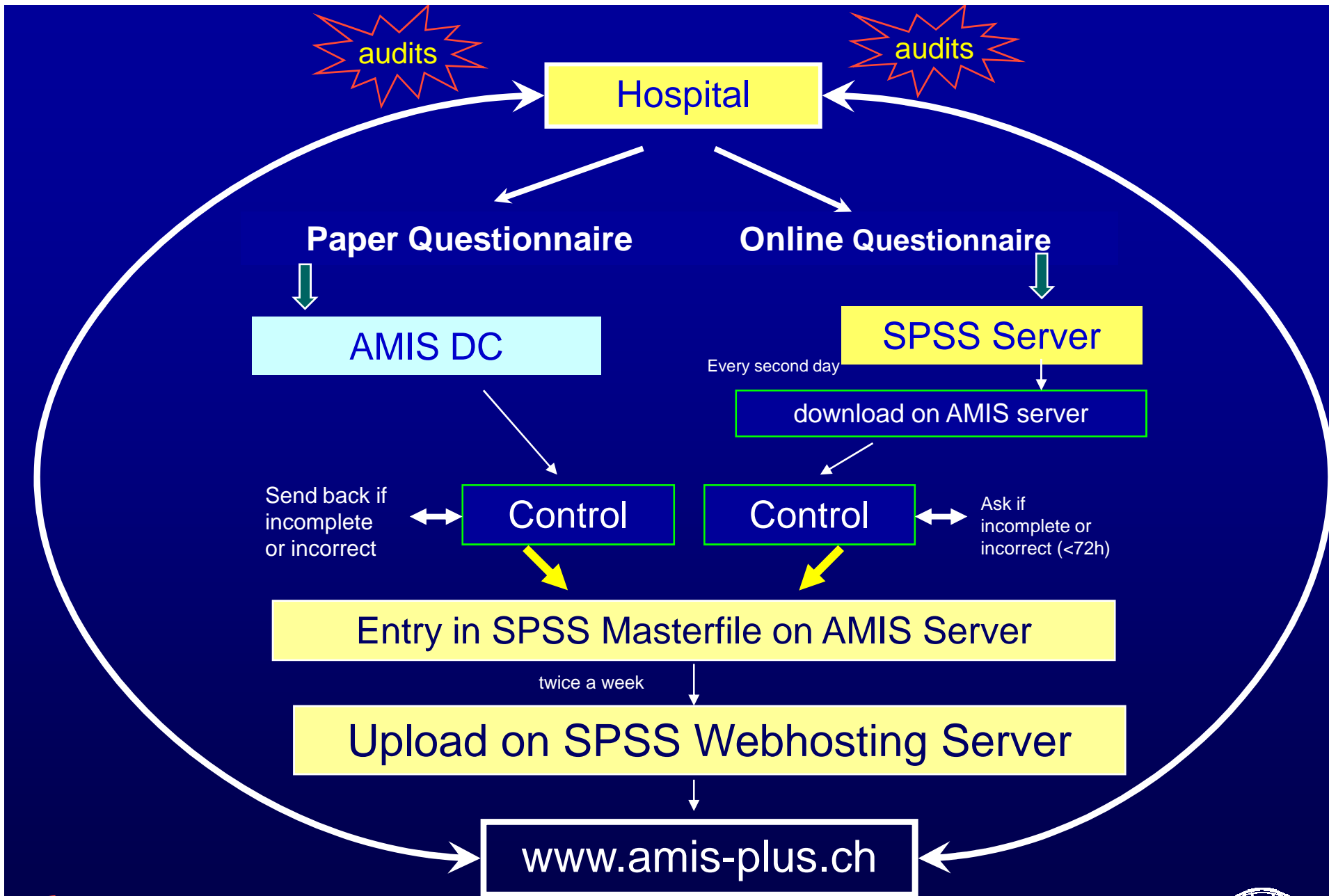
- Over 180 variables that include:
  - Demographics
  - Risk factors, symptoms
  - Immediate therapy
  - Laboratory parameters
  - Hospitalisation course and discharge treatment
- Since March 2005 long-term follow-up
  - 3-months
  - 12-months



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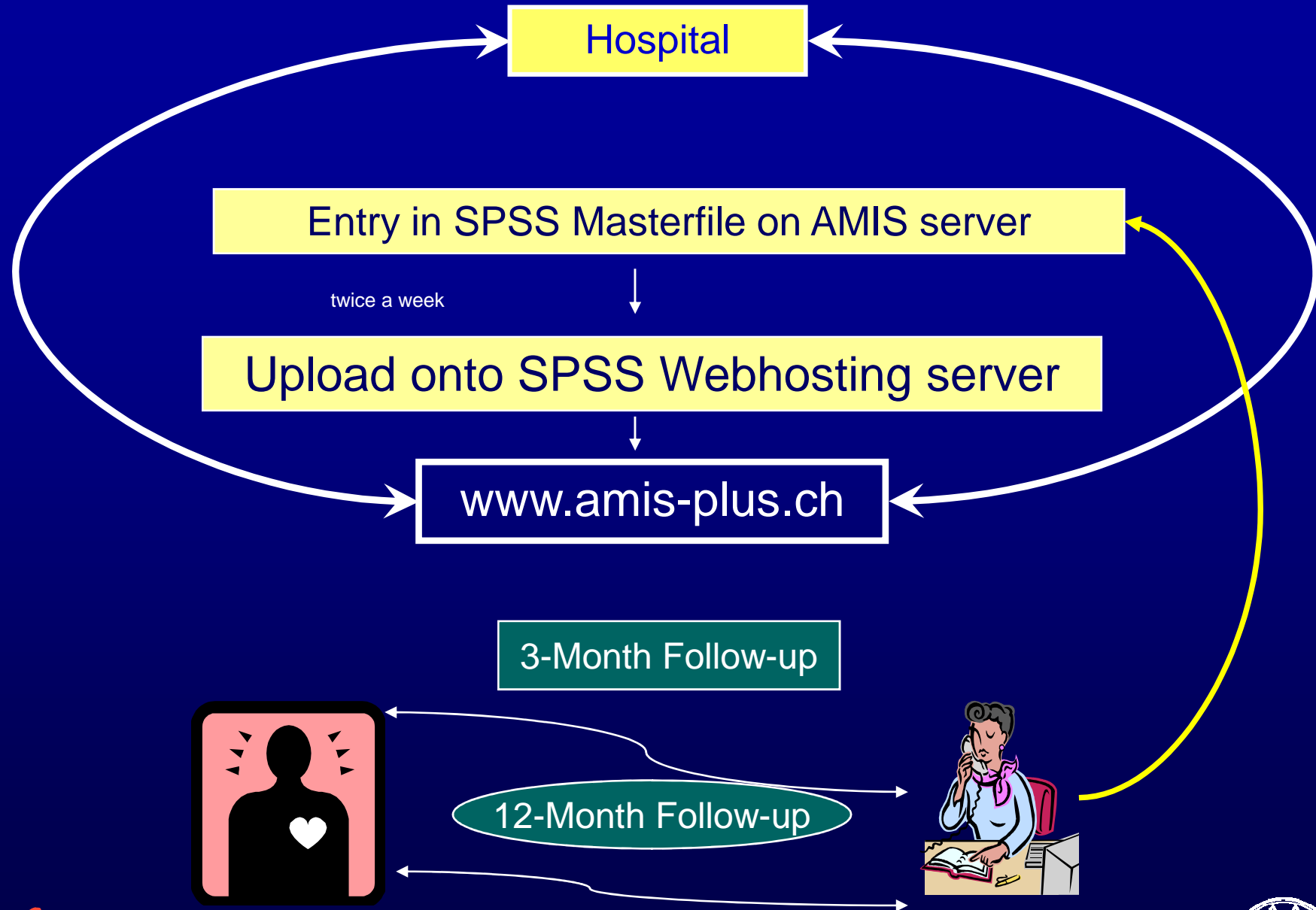




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## Data Center

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**Address:**  
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**AMIS Plus**

# Welcome

## AMIS Plus - National Registry of Acute Myocardial Infarction in Switzerland



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The AMIS Plus national registry collects and analyzes data on patients with acute coronary syndrome in Switzerland in the pre-admission and hospital phases. Emphasis is placed on the evaluation of risk factors, diagnostics, urgent therapy strategies, and treatment of acute coronary syndrome (acute myocardial infarction, unstable angina and minimal necrosis). The AMIS Plus data gathered are important for assessing guidelines, improving compliance with guidelines in clinical practice, investigating patient groups not extensively studied in large randomized trials, quality assurance as well as the continuous improvement of therapeutic strategies based on a large data base.

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## News and Events

**We have now passed the magical 30,000 cases mark in the AMIS Plus Database!**

Many thanks to all participants for their invaluable contribution!



### Sponsors' and Participants' Meeting

The AMIS Plus project is now in its twelfth year and we have reached a new milestone: the 30,000th case in the AMIS Plus database!

This is the perfect opportunity to invite all our sponsors, participants, colleagues and all people interested to the next AMIS Plus meeting.



# Welcome

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AMIS Plus

## Data Entry

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### ▶ AMIS Online Questionnaire

- Guide to Online Data Entry of the "AMIS Plus Questionnaire" (english) [\(PDF\)](#)
- Merkblatt für die AMIS Plus Online-Dateneingabe (deutsch) [\(PDF\)](#)
- Fiche d'instructions de saisie des données AMIS sur internet (français) [\(PDF\)](#)

### ▶ AMIS & Verein Outcome Online Erhebungsbogen

If you would like to test our online data entry, just click on <http://test.amis-plus.ch/SurveyManager>

and enter 'test' for both User ID and Password



Please choose a language! / Bitte wählen Sie eine Sprache! / Veuillez choisir une langue!

- English
- Deutsch
- Français

Weiter


Stop

# Follow up Online

Survey Manager - Microsoft Internet Explorer

Adresse <https://www.amis-plus.ch/SurveyManager/Forward.do?target=Followup>

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**Survey Manager** 

Followups

149 Followups found, displaying 1 to 10. [First/Prev] 1, 2, 3, 4, 5, 6, 7, 8 [Next/Last]

Patient #	Name	Hospital	Gender	Birthdate	Admission	Diagnosis	Followup #	Initial Contact	New Contact	Call	Modify	Delete
19007	[REDACTED]	CCTI	Male	25.07.1948	22.05.2005	Myocardial infarction	1	22.08.2005	-	<a href="#">Call</a>	<a href="#">Modify</a>	<a href="#">Delete</a>
19064	[REDACTED]	CCTI	Male	21.08.1952	27.05.2005	Myocardial infarction	1	27.08.2005	-	<a href="#">Call</a>	<a href="#">Modify</a>	<a href="#">Delete</a>
2804738	[REDACTED]	MUNS	Female	06.12.1953	01.11.2005	Unstable angina	1	01.02.2006	-	<a href="#">Call</a>	<a href="#">Modify</a>	<a href="#">Delete</a>
2841293	[REDACTED]	MUNS	Male	26.09.1918	06.01.2006	Myocardial infarction	1	06.04.2006	-	<a href="#">Call</a>	<a href="#">Modify</a>	<a href="#">Delete</a>
19007	[REDACTED]	CCTI	Male	25.07.1948	22.05.2005	Myocardial infarction	2	22.05.2006	-	<a href="#">Call</a>	<a href="#">Modify</a>	<a href="#">Delete</a>
0510088102	[REDACTED]	GENV	Male	29.04.1961	23.02.2006	Myocardial infarction	1	23.05.2006	-	<a href="#">Call</a>	<a href="#">Modify</a>	<a href="#">Delete</a>
19064	[REDACTED]	CCTI	Male	21.08.1952	27.05.2005	Myocardial infarction	2	27.05.2006	-	<a href="#">Call</a>	<a href="#">Modify</a>	<a href="#">Delete</a>
7064625	[REDACTED]	TIEF	Female	14.02.1960	07.03.2006	Myocardial infarction	1	07.06.2006	-	<a href="#">Call</a>	<a href="#">Modify</a>	<a href="#">Delete</a>
7528009	[REDACTED]	SCFH	Male	29.04.1924	10.03.2006	Myocardial infarction	1	10.06.2006	-	<a href="#">Call</a>	<a href="#">Modify</a>	<a href="#">Delete</a>
632704	[REDACTED]	SOLO	Male	25.06.1965	12.03.2006	Myocardial infarction	1	12.06.2006	-	<a href="#">Call</a>	<a href="#">Modify</a>	<a href="#">Delete</a>



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# Follow up Questionnaire

https://www.amis-plus.ch/WebService/MRWEBPL\_DLL?ACTION - Windows Internet Explorer

https://www.amis-plus.ch/WebService/MRWEBPL\_DLL?ACTION

Google

Go

Bookmarks

1 blocked

Check


AutoLink

AutoFill

Send to

Settings

https://www.amis-plus.ch/WebService/MRWEBPL\_DLL...

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Universität Zürich  
Institut für Sozial- und  
Präventivmedizin

Suivi à 12 mois: C [redacted] 72

Le patient est-il encore en vie?

oui

non

< back save & close next >

Fertig

Internet

100%



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# What's in it for the hospitals?



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# Online Analysis



User ID:  
  
Password:

To obtain a password, contact the site administrator.





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# Online Analysis



HOME LOG OUT

## 02. Age statistics grouped by gender and diagnosis

Created by SPSS (Schweiz) AG on 2005.06.24 10:31:04 PM

[<< Back to Category](#) | [Add to Quick Links](#)

[help](#)

### Age Statistics

Hospital type:

- All hospitals
- All hospitals
- Type A
- Type B

Compute

Type of hospital: All hospitals

Case filter: All Cases

### Age (in years)

**Age Statistics**

Year: Total  
diagnosis for all patients: Total  
Gender: Total

Variables: Age of patients (in years)

	Hospital ID	DEMO	Other hospitals
N	5608	1105	4503
Mean	65.40	65.17	65.45
Minimum	22	28	22
Maximum	100	94	100
Std. Deviation	13.083	13.300	13.030
Median	66.00	66.00	66.00

HOME LOG OUT





# Online Analysis



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## 02. Age statistics grouped by gender and diagnosis

Created by SPSS (Schweiz) AG on 2005.06.24 10:31:04 PM

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### Age Statistics

[help](#)

Hospital type:

All hospitals

Case Filter:

All Cases

Compute

Type of hospital: All hospitals

Case filter: All Cases

### Age (in years)

Age Statistics											
Year:	Total			Total			Total				
diagnosis for all patients:	Total			Total			Total				
Variables: Age of patients (in years)											
	Hospital ID			DEMO			Other hospitals				
	Total										
	Gender			Gender			Gender				
	Total			Male	Female	Total	Male	Female	Total	Male	Female
N	5608	4026	1582	1105	784	321	4503	3242	1261		
Mean	65.40	63.33	70.66	65.17	62.91	70.69	65.45	63.43	70.65		
Minimum	22	26	22	28	28	33	22	26	22		
Maximum	100	100	99	94	93	94	100	100	99		
Std. Deviation	13.083	12.872	12.107	13.300	13.141	12.023	13.030	12.806	12.133		
Median	66.00	64.00	73.00	66.00	63.00	73.00	66.00	64.00	72.00		

HOME LOG OUT

# AMIS Plus Registry

January 1997 to March 2009

- **30,234** patients with acute coronary syndrome

STEMI	58.3%
NSTEMI/UA	41.7%



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# AMIS Plus Registry

- **30,234 ACS** patients
- Gender:
  - female 28%,
  - male 72%
- Age: 65.6 y (13.1y)
  - Female 71.2 y (12.9 y)
  - Male 63.4 y (12.3 y)



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# AMIS Plus Registry

30,234 ACS patients

- Crude in-hospital mortality 6.8%
- STEMI
  - 1997 - 12.2%      2008 – 6.1%
- NSTEMI
  - 1997 - 8.2%      2008 – 3.6%



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# Status of Follow up

- Started in June 2005
- The starting time of FU was different for various hospitals
  - due to different approval dates from the Cantonal Ethic Commission and/or
  - internal organisational difficulties
- 44 hospitals have participated in follow-up
- One hospital performs own follow-up



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# Status of Follow-up

- 3-month follow-up
  - Total available 4278 / 4456 (96%)
- 12-month follow-up
  - Total available 3314 / 3423 (97%)



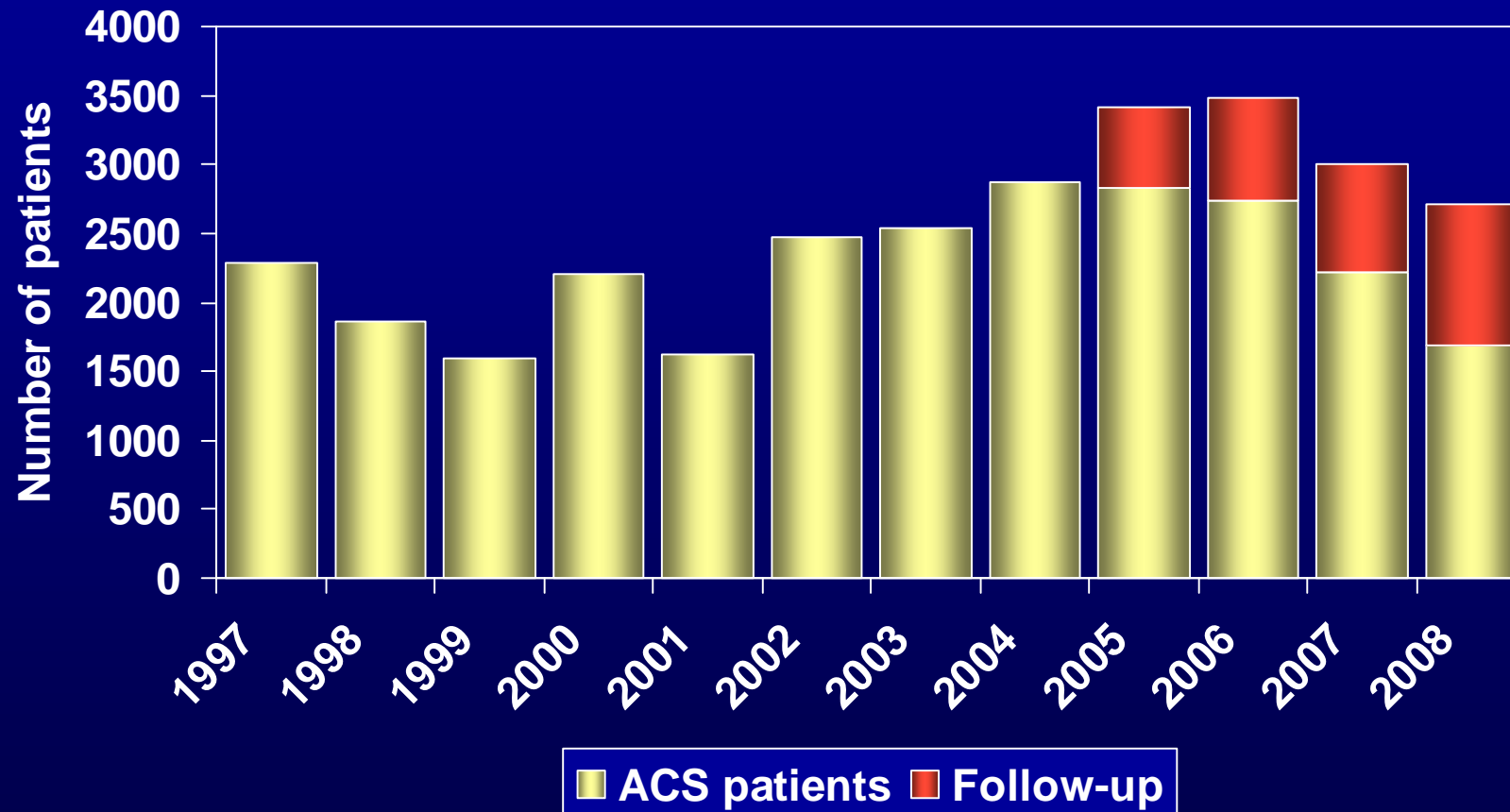
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# AMIS Plus Registry

## Number of patients and follow-ups



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# AMIS Plus Registry

> 30,000

patients enrolled



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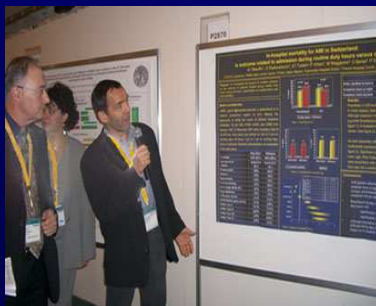
# Resulting in....

- 57 presentations at congresses and meetings



- 55 abstracts

» *Best Abstract Award for Excellence in Scientific Research*



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# Resulting in....

- 1 diploma
- 4 dissertations
- 2 press releases



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# AMIS Plus Publishing Activities

- Manuscripts

–published	21
• peer-reviewed	13
–in press	1
–submitted	5



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**ACUTE CORONARY SYNDROMES**

Gender differences in management and outcomes in patients with acute coronary syndromes: results on 20 290 patients from the AMIS Plus Registry

Dragana Radovanovic, Paul Erne, Philip Urban, Osmund Bertel, Hans Riddli, Jean-Michel Gaspoz, on behalf of the AMIS Plus Investigators

Heart 2007;93:1369-1375. doi: 10.1136/hrt.2006.106781

ORIGINAL ARTICLE

**Admission glycaemia and outcome in patients with acute coronary syndrome**

DAMARIS MÜDESPACHER, DRAGANA RADOVANOVIC, EDOARDO CAMENZIND, MANFRED ESSIG, OSMUND BERTEL, PAUL ERNE, FRANZ ROBERT EBERLI, FELIX GUTZWILLER ON BEHALF OF THE AMIS PLUS INVESTIGATORS

**Abstract**  
Some studies of patients with acute myocardial infarction have reported that hyperglycaemia at admission may be associated with a worse outcome. This study sought to evaluate the association of blood glucose at admission with the outcome of unselected patients with acute coronary syndrome (ACS).

Intervals [CI] 1.05-1.14, p<0.001) per mmol/L. The OR for in-hospital mortality was 1.04 (95% CI 0.99-1.1; p=0.140) per mmol/L for patients with diabetes but 1.21 (95% CI 1.12-1.30; p<0.001) per mmol/L for non-diabetic patients.

In conclusion, elevated glucose level in ACS patients on admission is a significant independent predictor of in-hospital mortality and is even more important for

**CLINICAL RESEARCH STUDY**

**Impact of Changing Definitions for Myocardial Infarction: A Report from the AMIS Registry**

Philip Urban, MD,<sup>a</sup> Dragana Radovanovic, MD,<sup>b</sup> Paul Erne, MD,<sup>c</sup> Jean-Christophe Stauffer, MD,<sup>d</sup> Giovanni Pedrazzini, MD,<sup>e</sup> Stephan Windecker, MD,<sup>f</sup> Osmund Bertel, MD,<sup>g</sup>; For the AMIS Plus investigators

<sup>a</sup>Cardiovascular Department, La Tour Hospital, Geneva, Switzerland; <sup>b</sup>AMIS Plus Data Center, Institute of Social and Preventive Medicine, University of Zurich, Zurich, Switzerland; <sup>c</sup>Cardiology Department, Cantonal Hospital, Luzern, Switzerland; <sup>d</sup>Cardiology Center, Cantonal Hospital, Fribourg, Switzerland; <sup>e</sup>Cardiocentro, Lugano, Switzerland; <sup>f</sup>Cardiology Department, Inselspital, Bern, Switzerland; <sup>g</sup>Cardio-Vascular Center Zurich, Klinik im Park, Zurich, Switzerland.

**Age-Related Differences in the Use of Guideline-Recommended Medical and Interventional Therapies for Acute Coronary Syndromes: A Cohort Study**

Andreas W. Schoenenberger, MD,<sup>\*,†</sup> Dragana Radovanovic, MD,<sup>†</sup> Jean-Christophe Stauffer, MD,<sup>‡</sup> Stephan Windecker, MD,<sup>§</sup> Philip Urban, MD,<sup>¶</sup> Franz R. Eberli, MD,<sup>\*\*</sup> Andreas Gutzwiller, MD, DrPH,<sup>††</sup> and Paul Erne, MD,<sup>‡‡</sup> for the AMIS Plus Investigators

**Annals of Internal Medicine**

**Diagnosis and Treatment of**



**Simple point of care risk stratification in acute coronary syndromes: The AMIS model**

David J. Kurz, Abraham Bernstein, Katrin Hunt, Dragana Radovanovic, Paul Erne, Zbigniew Siudak and Osmund Bertel

Heart published online 9 Dec 2008;

Downloaded from heart.bmjournals.com on 17 June 2005

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**CARDIOVASCULAR MEDICINE**

**Trends in reperfusion therapy of ST segment elevation myocardial infarction in Switzerland: nationwide registry**

A-A Fassa, P Urban, D Radovanovic, N Duvoisin, J-M Gaspoz Plus Investigators

...the incidence of acute myocardial infarction... data collected among patients with acute cardiac care... acute coronary syndrome... overall cardiovascular mortality...

**Objective:** To document the trends in reperfusion therapy (STEMI) in Switzerland.  
**Design:** National prospective multicentre registry, AMIS (Switzerland), of patients admitted with acute myocardial infarction in Switzerland.  
**Setting:** 54 hospitals of varying size and capability in Switzerland.  
**Patients:** 7098 of 11 845 AMIS Plus patients who present with ST-segment elevation myocardial infarction and ST-segment elevation on the ECG at admission.  
**Main outcome measures:** In-hospital mortality and its predictors.  
**Results:** The proportion of patients treated by primary percutaneous coronary intervention increased from 1997 to 2003, from 14.1% to 20.7%.



**Clinical Trial**

Heart Drug 2003;3:134-140  
DOI: 10.1159/00073838

**Early Drug Therapy and In-Hospital Mortality following Acute Myocardial Infarction**

Paul Erne<sup>a</sup> Dragana Radovanovic<sup>b</sup> Philip Urban<sup>d</sup> Jean-Christophe Stauffer<sup>e</sup> Osmund Bertel<sup>c</sup> Felix Gutzwiller<sup>b</sup> for the AMIS Plus Investigators<sup>1</sup>

<sup>a</sup>Division of Cardiology, Kantonsspital, Luzern, <sup>b</sup>AMIS Plus Data Center, Institute for Social and Preventive Medicine, University Zurich, <sup>c</sup>Division of Cardiology, Stadtspital Triemli, Zurich, <sup>d</sup>Division of Cardiology, Hôpital La Tour, Genève, <sup>e</sup>Division of Cardiology, Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland

**Key Words**

Drug therapy · Acute myocardial infarction · In-hospital mortality

...participating hospitals between 1997 and 2003. The effect of factors and drug therapy on in-hospital mortality was assessed by logistic regression analysis. **Results:** Age and diabetes were independent predictors of in-hospital mortality.

Cardiovasc Drugs Ther (2007) 21:389-398  
DOI 10.1007/s10557-007-6044-0

**Determinants of Costs of Coronary Syndromes: A Study of More Than 10 000 Patients**

Martina Greenberg, Dragana Radovanovic, Paul Erne, Thomas D. Szucs

**CARDIOLOGY**

**Original Research**

Cardiology 2008;109:156-162  
DOI: 10.1159/000106676

**The Impact of Statin Treatment on Presentation Mode and Early Outcomes in Acute Coronary Syndromes**

F.R. Eberli, J.C. Stauffer, O. Bertel, P. Erne

# AMIS Plus Publishing Activities

- Ongoing works:
  - Manuscripts 8
  - Dissertation 1
  - Master Thesis 1



A Acute  
M Myocardial  
I Infarction in  
S Switzerland

D. Radovanovic, Berne 5 March 2009



# Future

Thanks to your support and our efforts

- Keep working on this unique registry
- Better representation by including all hospitals in Switzerland treating AMI patients
- Expand follow-ups
- Hub for new topics and studies
- Perform further analyses from existing data pool
- Enhance publishing activity



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# AMIS Plus Project



Thank you!



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