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The use of revascularization strategies in patients with acute coronary syndromes admitted to hospitals without catheterization facilities: Results from the ALERT-CZ registry

Petr Widimský[a], Jana Zvárová[b], Zdeněk Monhart[c], Petr Janský[d] jménem řešitelů registru ALERT-CZ[e]

[a] *III. interní-kardiologická klinika, Kardiocentrum 3. lékařské fakulty Univerzity Karlovy a Fakultní nemocnice Královské Vinohrady, Praha, Česká republika*
[b] *EuroMISE centrum, Ústav informatiky, Akademie věd ČR, Praha, Česká republika*
[c] *Interní oddělení, Nemocnice Znojmo, Znojmo, Česká republika*
[d] *Kardiochirurgická klinika, 2. lékařská fakulta Univerzity Karlovy a Fakultní nemocnice Motol, Praha, Česká republika*
[e] *Viz apendix pro úplný seznam řešitelů registru*

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ABSTRACT

Aim: Percutaneous coronary intervention (PCI) became the standard of care for patients (pts) with acute coronary syndromes (ACS). The Czech Republic is among European countries with well developed networks of PCI and non-PCI hospitals. Ample data about PCI-treated pts is available from many registries. Much less is known about treatments and outcomes of ACS pts admitted to hospitals without cath-lab. ALERT-CZ registry was designed specifically to analyze these patients presenting to local non-PCI hospitals. The aim was to see, whether the ESC guidelines are implemented in these local, small hospitals.

Methods and results: A total of 6265 pts with first hospital admission for ACS has been enrolled in 32 Czech community hospitals without cath-lab during a 3-year period (7/2008–6/2011). The mean age was 69.7 ±12,3 years, 39.5% were females, 35.4% had known diabetes mellitus, 76.0% hypertension, 28.3% previous myocardial infarction and 12.0% previous stroke. Twenty-five percent of pts had signs of acute heart failure (Killip II in 19.0%, Killip III in 4.8% and Killip IV in 1.1%). The discharge diagnosis was ST-elevation myocardial infarction (STEMI) in 26.1%, non-STEMI in 53.1% and unstable angina pectoris (UAP) in 20.9%.

Emergent interhospital transport to coronary angiography (CAG) and PCI within < 12 h from symptom onset was indicated in 73.4% of STEMI pts, elective CAG was indicated in 15.9% of STEMI, CAG was not indicated in 9.9% of STEMI and 0.9% STEMI pts refused CAG. Among non-STE ACS pts CAG was performed within < 24 h in 16.2%, between 24–72 h in 18.2%, later in 38.1%, not indicated in 22.7%, refused by pts in 4.8%. The median stay in the PCI center was 2.0 days and only 37% pts returned after CAG (± PCI) to the referring community hospital, the rest was discharged from PCI center directly to home.

Among STEMI pts the median time intervals were: pain – first medical contact (FMC) 120 min, FMC – community hospital door 30 min, door-in-door-out for emergency transfer 23 min. Thrombolysis was used in 0.4% of STEMI – in rare situations when immediate transfer was logistically not possible.

PCI was performed in 41.6% pts overall (65.9% STEMI, 35.8% non-STEMI and 26.4% UAP). CABG was performed in 2.9% pts overall (2.1%, 3.1% and 3.6% per diagnosis). Detailed pharmacotherapy data as well as indirect comparison with a separate PCI centers registry is beyond the space frame of this abstract and will be presented. The overall in-hospital mortality was 7.2%. Mortality per final diagnosis was 9.5% (STEMI), 8.7% (non-STEMI) and 0.5% (UAP). Mortality per age group was 16.2% (> 80 years), 8.0% (70–80 years) and 2.4% (< 70 years).

Conclusion: Patients presenting to non-PCI hospitals undergo revascularization procedures less frequently than those directly admitted to PCI centers. This may be related to baseline differences. The outcomes are influenced by these facts.

Adresa: Prof. MUDr. Petr Widimský, DrSc., FESC, FACC, III. interní-kardiologická klinika, Kardiocentrum 3. lékařské fakulty Univerzity Karlovy a Fakultní nemocnice Královské Vinohrady, Ruská 87, 100 00 Praha 10, e-mail: petr.widimsky@fnkv.cz
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Klíčová slova:
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Infarkt myokardu
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Nemocnice bez vybavení pro PCI
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Perkutánní koronární intervence
Revaskularizace

SOUHRN

Cíl: Perkutánní koronární intervence (PCI) se stala standardem péče o pacienty s akutními koronárními syndromy (AKS). Česká republika patří mezi evropské země s dobře propracovanou sítí spolupracujících nemocnic provádějících PCI a nemocnic, které tento výkon neprovádějí. Z řady registrů je k dispozici množství údajů o pacientech léčených pomocí PCI. Mnohem méně se toho ví o způsobu léčby a výsledném stavu pacientů s AKS hospitalizovaných v nemocnicích bez katetrizačních sálů. Cílem registru ALERT-CZ bylo konkrétně analyzovat údaje těchto pacientů dopravených do místních nemocnic neprovádějících PCI a zjistit, zda se v místních, malých nemocnicích uplatňují doporučené postupy Evropské kardiologické společnosti.

Metody a výsledky: Do projektu bylo zařazeno celkem 6 265 pacientů poprvé hospitalizovaných pro AKS ve 32 českých komunitních nemocnicích bez katetrizačních sálů během tříletého období (7/2008–6/2011). Průměrný věk těchto pacientů byl 69,7 ± 12,3 roku, ve 39,5 % šlo o ženy, 35,4 % mělo diagnózu diabetes mellitus, 76,0 % hypertenzi, 28,3 % již dříve prodělalo infarkt myokardu a 12,0 % cévní mozkovou příhodu. Pětadvacet procent pacientů vykazovalo známky akutního srdečního selhání (Killipova třída II v 19,0 %, třída III v 4,8 % a třída IV v 1,1 % případů). Diagnózou při propuštění byl infarkt myokardu s elevací úseku ST (STEMI) ve 26,1 %, infarkt myokardu bez elevací úseku ST (non-STEMI) v 53,1 % a nestabilní angina pectoris (NAP) ve 20,9 % případů. Naléhavý převoz mezi nemocnicemi k provedení koronarografie a PCI do 12 hodin od nástupu symptomů byl indikován u 73,4 % pacientů se STEMI, plánovaná koronarografie u 15,9 % pacientů se STEMI; koronarografie nebyla indikována u 9,9 % pacientů se STEMI, a 0,9 % pacientů se STEMI odmítlo její provedení. Z pacientů s non-STE AKS byla koronarografie provedena do 24 hodin u 16,2 %, mezi 24 a 72 hodinami u 18,2 %, ještě později u 38,1 %, koronarografie nebyla indikována u 22,7 %, provedení koronarografie odmítlo 4,8 % pacientů. Průměrná délka pobytu v zařízení s možností provést PCI byla 2,0 dne a pouze 37 % pacientů se po koronarografii (± PCI) vrátilo do původní komunitní nemocnice, ostatní byli propuštěni přímo domů. U pacientů se STEMI byl medián intervalů následující: bolest – první kontakt s lékařem (first medical contact – FMC) 120 min, FMC – dveře komunitní nemocnice 30 min, příjezd ke dveřím komunitní nemocnice a odvoz rychlou záchrannou službou od dveří komunitní nemocnice 23 min. Trombolýza byla provedena u 0,4 % pacientů se STEMI, a to ve vzácných případech, kdy nebyl z logistických důvodů okamžitý převoz z komunitní nemocnice možný.

Perkutánní koronární intervence byla provedena celkem u 41,6 % pacientů (65,9 % se STEMI, 35,8 % non-STEMI a 26,4 % s NAP). Koronární bypass (CABG) byl proveden celkem u 2,9 % pacientů (2,1 %, resp. 3,1 % a 3,6 % podle výše uvedených diagnóz). Podrobné údaje o farmakoterapii i nepřímé porovnání se samostatnými registry zařízení s vybavením pro provádění PCI přesahují rozsah tohoto abstraktu a budou uvedeny jinde.

Celková nemocniční mortalita činila 7,2 %. Mortalita podle konečné diagnózy byla 9,5 % (STEMI), 8,7 % (non-STEMI) a 0,5 % (NAP). Hodnoty mortality podle věkových skupin byly 16,2 % (> 80 let), 8,0 % (70–80 let) a 2,4 % (< 70 let).

Závěr: Pacienti přivezení do nemocnic nevybavených pro provádění PCI absolvují revaskularizační výkony méně často než nemocní transportovaní přímo do nemocnic s katetrizačními sály. To může souviset s rozdíly ve vstupní charakteristice a výsledky mohou být těmito skutečnostmi ovlivněny.

Introduction

Percutaneous coronary intervention (PCI) became the standard of care for patients with acute coronary syndromes (ACS). The European Society of Cardiology (ESC) guidelines [1] recommend emergent (primary) PCI as the initial reperfusion therapy for all patients with ST-segment elevation acute myocardial infarction (STEMI), who present within 12 h from symptom onset and in whom such therapy can be initiated within 120 min from diagnostic 12-lead electrocardiogram (ECG). ESC guidelines for non-ST elevation ACS [2] recommend acute coronary angiography (with PCI whenever indicated) within < 2 h from hospital admission for high risk non-STE ACS and within < 24–72 h for those at intermediate risk.

Ample data about PCI-treated pts is available from many registries [3–9]. Much less is known about treatments and outcomes of ACS pts admitted to hospitals without cath-lab. Thus, the ALERT-CZ *(Acute coronary syndromes – Longitudinal Evaluation of Real-life Treatment in non-PCI hospitals in the Czech Republic)* registry was designed specifically to analyze these pts presenting to local non-PCI hospitals. The aim was to see, whether the ESC guidelines are implemented in these local, small hospitals.

Methods

The Czech Republic is one of the European countries with well developed networks of PCI and non-PCI hospitals. The country population 10.5 million is served by 22 PCI centers adequately distributed across all 13 counties. All 22 PCI centers routinely offer non-stop (24/7) PCI services.

The ALERT-CZ registry enrolled 6265 patients with their first hospital admission for ACS in 32 Czech community hospitals without catheterization facilities during a 3-year period (July 1, 2008–June 30, 2011). The baseline characteristic of the enrolled patients is described in Table 1.

The registry was organized and coordinated by the Cardiocenter, Third Faculty of Medicine, Charles University Prague. Data was collected via a dedicated electronic case report form prepared and managed by the EuroMISE center of Charles University and Academy of Sciences of the Czech Republic. The patients baseline characteristics, pharmacotherapy, revascularization therapy and in-hospital outcomes were registered.

Statistical methods

The paper presents some results of descriptive statistics calculated from data of all ACS patients and in sub-

Table 1 – The key baseline characteristic of ALERT-CZ patients.

	All ACS patients	STEMI	Non-STEMI	UAP
n =	**6265**	**1630 (26.1%)**	**3319 (53.1%)**	**1306 (20.9%)**
Mean age (SD)	69.7 (12.3)	66.3 (13.2)	71.3 (12.0)	69.9 (11.3)
Females	39.5%	32.4%	41.9%	41.9%
Diabetes mellitus	35.4%	26.0%	39.5%	36.4%
Hypertension	76.0%	63.7%	78.2%	85.8%
Previous myocardial infarction	28.3%	15.0%	29.7%	41.3%
Previous stroke	12.0%	8.6%	13.7%	11.7%
Killip II on admission	19.0%	16.1%	21.6%	16.2%
Killip III on admission	4.8%	4.4%	6.3%	1.5%
Killip IV on admission	1.1%	2.2%	1.0%	0.0%

groups of STEMI, non-STEMI a UAP patients. Most of basic statistical characteristics are expressed in percentages – no inductive statistical methods are presented in this paper.

Results

In-Hospital outcomes

The overall in-hospital mortality was 7.2%. Mortality per final diagnosis was 9.5% (STEMI), 8.7% (non-STEMI) and 0.5% (UAP). Mortality per age group was 16.2% (> 80 years), 8.0% (70–80 years) and 2.4% (< 70 years). Mortality per sex was 5.8% (males) and 9.3% (females). Mortality in revascularized (PCI/CABG) patients was 2.1 % (n = 2725), and in non-revascularized 11.3 % (n = 3468). Mortality data in additional subgroups are in Table 2.

A new stroke during this hospital stay occurred in 0.6% of patients. Cardiogenic shock developed during the hospital stay in 4.9% of patients (8.7% STEMI, 4.8% non-STEMI and 0.4% UAP) – on top of those 1.1% patients in whom the shock was present upon initial presentation. The *clinical* diagnosis of recurrent myocardial infarction during the hospital stay was done in 2.3% of patients. Among the patients transferred to PCI centers, the mean stay in the PCI center was 2.9 ± 3.1 days and only 37% pts returned after CAG (± PCI) to the referring community hospital, the rest was discharged from PCI center directly to home. PCI was performed in 41.6% pts overall (65.9% STEMI, 35.8% non-STEMI and 26.4% UAP). CABG was performed in 2.9% pts overall (2.1%, 3.1% and 3.6% per diagnosis).

Table 2 – Mortality in subgroups.

Mortality (%)	All	Revascularized (PCI/CABG)	Non-revascularized
STEMI	9.5	4.1	20.9
non-STEMI	8.7	1.0	13.6
UAP	0.5	0.0	0.7
Age < 70 years	2.4	0.4	4.7
Age 70–80 years	8.0	3.2	11.3
Age > 80 years	16.2	6.9	19.5
Males	5.8	1.7	10.0
Females	9.3	2.8	13.0

STEMI subgroup

The emergent interhospital transport to coronary angiography (CAG) and PCI within < 12 h from symptom onset was indicated in 73.4% of STEMI pts, elective CAG was indicated in 15.9% of STEMI, CAG was not indicated in 9.9% of STEMI and 0.9% STEMI pts refused CAG. The mean time intervals were: pain – first medical contact (FMC) 450 ± 1410 min (median 120 min), FMC – community hospital door 44 ± 60 min (median 30 min), door-in-door-out for emergency transfer 57 ± 167 min (median 23 min). Thrombolysis was used in 0.4% of STEMI – in rare situations when immediate transfer was logistically not possible.

Non-STE ACS subgroup

Among non-STE ACS pts CAG was performed within < 24 h in 16.2%, between 24–72 h in 18.2%, later in 38.1%, not indicated in 22.7%, refused by pts in 4.8%.

Discussion

Study limitations

The main study limitation is that in most hospitals the patient enrollment was not done on a consecutive way. Some hospitals enrolled almost all their ACS patients, while others only a small proportion. Furthermore, this registry cannot provide complete picture about ACS treatment in the country because patients with STEMI or with severe non-STEMI (e.g. complicated by acute heart failure and ST depressions) who call the emergency medical service number 155 are usually bypassing the nearest non-PCI hospital and are directly admitted to a PCI center. Thus, the population presented in this manuscript is largely composed from those ACS patients who presented themselves (or by a family member) to the nearest hospital.

Reperfusion treatment for STEMI

In general, the proportion of patients with STEMI referred for primary reperfusion was lower than expected. The explanation has three components: (1) the most clinically apparent STEMI patients bypassed these non-PCI hospitals as mentioned above, (2) many of the STEMI patients treated conservatively presented after > 12 h from symptom onset, (3) some patients (usually the very elderly) presented with atypical symptoms and/or had multiple co-morbidities and were thus considered not suitable for transfer to a PCI center.

Conclusion

Patients presenting to non-PCI hospitals undergo revascularization procedures less frequently than those directly admitted to PCI centers. This may be related to baseline differences. The outcomes are influenced by these facts.

Acknowledgements

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Appendix

The list of participating hospitals and investigators with number of enrolled patients in these hospitals:

Investigator:	Hospital:	Pts enrolled:
MUDr. Pavel Ježil	Nemocnice Chomutov	53
MUDr. Ivana Kellnerová	Svitavská nemocnice	118
MUDr. Jitka Kobrlová	Masarykova městská nemocnice v Jilemnici	119
MUDr. Pavel Třeštík	Kroměřížská nemocnice	647
MUDr. Michaela Melounová	Nemocnice Sušice	87
MUDr. Josef Štumar	Nemocnice Třebíč	159
MUDr. Josef Pola	Nemocnice Tanvald	93
MUDr. Hana Grünfeldová	Městská nemocnice Čáslav	164
MUDr. Olga Šantorová	Rokycanská nemocnice	153
MUDr. Zdeněk Monhart, Ph.D.	Nemocnice Znojmo	567
MUDr. Martina Kalová	Městská nemocnice v Litoměřicích	163
MUDr. Kamil Zeman, Ing.	Nemocnice ve Fr.-Místku	402
MUDr. Jakub Tocháček	Stodská nemocnice	84
MUDr. Veronika Sedláková	Oblastní nemocnice Kladno	273
MUDr. Gabriel Marcinek	Nemocnice Slaný	173
Doc. MUDr. Josef Jandík, CSc.	Oblastní nemocnice Náchod	76
Doc. MUDr. Karel Sochor, CSc.	Jessenia, a. s., Nemocnice Beroun	36
MUDr. Pavel Šíma	Oblastní nemocnice Mladá Boleslav	915
MUDr. Michal Hondl	Krajská zdravotní, a. s., Nemocnice Děčín	74
MUDr. Jan Vohralík	Karlovarská krajská nemocnice, a. s., Nemocnice Cheb	311
MUDr. Oldřich Honců	Panochova nemocnice Turnov	146
MUDr. Kamil Tachir	Nemocnice Nové Město na Moravě	277
MUDr. Libor Horáček	Nemocnice sv. Zdislavy, a. s., Velké Meziříčí	16
MUDr. David Gerber	Domažlická nemocnice	201
MUDr. Pavel Sábl	Nemocnice s poliklinikou v Semilech	162
MUDr. Hana Froňková	Městská nemocnice PRIVAMED Healthia Rakovník	76
MUDr. Vratislav Dědek	Orlickoústecká nemocnice	127
MUDr. Tomáš Mičkal	Nemocnice Hranice	11
MUDr. Ivan Andr	Oblastní nemocnice Trutnov	71
MUDr. Vladimír Kapal	Uherskohradišťská nemocnice	457
MUDr. Jan Švejda	Nemocnice Milosrdných sester Karla Boromejského v Praze	17
MUDr. Jan Semrád	Nemocnice sv. Alžběty, Louny	37

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