Long-term trends in the incidence, treatment, hospital fatality and subsequent mortality from acute myocardial infarction in the Czech Republic

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Aims. Studies on the incidence, acute and subsequent mortality from myocardial infarction are limited mostly to selected clinical cohorts and populations and cover relatively short periods. Our aim was to describe and analyse long-term trends on a national scale.
Methods. Acute myocardial infarction (AMI) was defined by the International Classification of Diseases (ICD)10; codes I21 and I22. Our natiowide 1994-2016 data on AMI mortality were obtained from the official mortality statistics (Czech Bureau of Statistics), data on morbidity (hospitalizations) from the National Register of Hospitalizations (Institute for Health Information and Statistics). For further analyses, data from the Czech EUROASPIRE I-V and Czech IMPACT studies were used.
Results. Over the 1994-2016 period the total number of AMI cases per year decreased from 34,084 to 19,015, that of patients hospitalized for AMI from 22,373 to 15,419, the total number of deaths due to AMI from 14,834 to 4,673, in those treated because of AMI from 3,794 to 1,137, and hospital fatality in patients treated for AMI decreased from 17% to 7.5%. Over the years 1997-2016, the one-year all-cause mortality rate after AMI declined from 25.1 to 17.9%, cardiovascular (CV) mortality from 22.3 to 14.2%, five-year all-cause mortality from 41.7 to 34%, and CV mortality from 34.1 to 23.6%.
Conclusion. The Czech Republic has witnessed a pronounced decrease in AMI incidence and fatality and, consequently, long-term mortality. The decreasing incidence and improving course of AMI are due to progress in primary prevention, in acute coronary care and interventional cardiology, and in secondary coronary heart disease (CHD) prevention.

Key words: acute myocardial infarction, AMI incidence and fatality trends, post-AMI mortality trends, AMI intervention and treatmen, primary and secondary prevention of AMI

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INTRODUCTION

In the Czech Republic, the decrease in cardiovascular (CV), and coronary heart disease (CHD) mortality in particular, started after 1990 (the year of transition from a totalitarian regime to a democratic society), considerably later than the decline in the USA or Western Europe. Importantly, the decrease in CV mortality has been a continuous and intensive one. The decrease in CHD mortality was driven by declining mortality rates from acute forms of CHD. However, mortality for chronic CHD (I25) stopped declining after 2000 to even increase slightly in the ensuing years, while that from acute forms of CHD continued to decrease at a slower pace[1].

We felt that an all-round analysis of long-term trends in the incidence, treatment, hospital fatality and subsequent mortalityand recurrenceof acute myocardial infarction (AMI) in the Czech Republic, one of the countries of Central and Eastern Europe that has undergone major political and social changes, might be useful. No studies analysing long-term trends on a nation wide scale and in its complexity in the countries in transition have been published to date.

Studies analysing the long-term trends in the incidence of and mortality from AMI in other countries have been, with some exceptions[2-5], restricted to shorter time periods, selected subpopulations or AMI subtypes, or have presented earlier data[6-14]. While trends in AMI prevalence, hospitalizations and mortality in the Czech Republic up to 2010 were published[15-17], long-term trends in survival after AMI have not been analysed and described yet.

New treatments and their outcomes, also of acute CHD, are based on clinical studies, but these are carried out in selected populations, limited in time and cannot provide data on morbidity and mortality in large populations, hence knowledge of trends in these statistics and identification of contributing factors on a population-wide scale is obviously useful.

METHODS

Data sources and study population

Acute myocardial infarction was defined according to the International Classification of Diseases (ICD)-10; codes I21 and I22. In clinical practice, the diagnosis was based on specific pain, dynamic changes of ECG consistent with the diagnosis of AMI and increased levels of biomarkers, initially muscle-brain-type creatine kinase replaced in about the year 2005, by the more precise temporal analyses of troponin T/I (ref.[18]). On the other hand, the number of autopsies in the Czech Republic decreased in that period, which may make the post-mortem diagnoses less accurate. Our nationwide data (current population of 10.6 million) on AMI mortality were obtained from the National Register of Causes of Deaths of the Czech Bureau of Statistics; the register is based on death certificates. Morbidity data were obtained from the National Register of Hospitalizations, a population-wide register collecting data on individuals admitted for stationary hospital treatment (Institute of Medical Information and Statistics of the Czech Republic. For each year of our study, spanning the 1994-2016 period, index hospitalizations for AMI and deaths on AMI were analysed and calculated. For the purpose of our study, nationwide data on coronary revascularization procedures were obtained from the National Register of Cardiac Surgery Procedures and Cardiovascular Interventions receiving data from cardiovascular intervention centres and departments of cardiac surgery.

Regarding patients hospitalized for AMI, we acquired data on their rehospitalizations and, possibly, later death. In our analysis of long-term survival after AMI, the time from the beginning of first hospitalization for AMI to the date of death or to the end of the year 2016 was used to evaluate the 20-year period from 1997 to 2016, with data covering the 1994–1996 period used for verification of hospitalization history and in an effort to minimize any potential bias due to inclusion of patients who had been already hospitalized before the analysed period.

In our analysis, reinfarction was defined as hospitalization for AMI occurring not earlier than 30 days after the end of a preceding hospitalization for AMI. This was because our underlying data did not allow us to determine whether the subsequent hospitalization involved transfer of a patient or admission for a new AMI, so the 30-day period should eliminate most of the patient transfers to another hospital and prevent their inclusion among reinfarctions.

For analyses of secondary prevention of AMI, we used data from the Czech EUROASPIRE I-V studies, which are five independent cross-sectional descriptive surveys of patients examined six months to two years after hospitalization for acute coronary syndrome and/or coronary revascularization, and undertaken in 1995-1996, 1999-2000, 2006-2007, 2012-2013 and 2016-2017 as part of a European project[19]. For analyses of the impact of risk factors and medication changes on CHD mortality decrease, the results of the Czech IMPACT Study, based on calculations developed by British authors, were used[20].

Statistical analysis

For data on the incidence and fatality of AMI, descriptive statistics of trends was used. When analysing subsequent and long-term mortality after AMI, mortality rates were assessed using the cumulative incidence method. The values were standardized by age to eliminate any potential bias due to the aging of the Czech population.

RESULTS

Trends in AMI incidence and hospitalizations

To calculate the number of AMI within a current year, we used the number of registered hospitalized persons, based on each patient's personal identity code. By adding to the number of persons hospitalized for AMI that of all those deceased for AMI minus those deceased during hospital treatment for AMI, we calculated the total number (incidence) of AMI in the respective year. The incidence of AMI declined from 34,084 in 1994 to 19,015 in 2016 (down by 44.2%). The number of persons hospitalized for AMI decreased from 22,373 in 1994 to 15,419 in 2016 (down by 31.1%), with a continuous decrease being interrupted only in 2003 and 2004 by a mild temporary increase. The standardized AMI incidence rate per 100,000 inhabitants European standard population, ESP) fell from 473.2 in 1994 to 192.7 in 2016 (decrease of 59.3%), and the standardized rate of hospitalized persons from 299.2 to 154.1 (decrease of 48.5%). The proportion of men was higher in AMI incidence as well as in patients hospitalized for AMI and slightly increasing. The mean age was significantly higher in hospitalized women than men, and increased in both sexes (Table 1). AMI incidence and number of persons hospitalized decreased during 1994-2016 in all age groups. The decrease was most pronounced in the age group 0-49 years, and least in the age group 80+, where the decrease in the number of hospitalized persons was only 5.8% (Table 2).

The total number of reinfarctions per year showed an upward trend to 2004, but did not change substantially in the ensuing years (Table 3). The proportion of reinfarctions within the total number of AMI treated per year continued to rise, but they tended to happen later after the first event: e.g.1997 vs. 2015. Reinfarction within one year occurred in 3.8% and 2.4%, respectively.

Trends in AMI mortality and fatality

Total AMI mortality showed a pronounced decrease: 14,834 AMI deaths in 1994 and only 4,673 in 2016 (down by 68.5%). The standardized AMI-related mortality rate per 100,000 inhabitants (ESP) fell from 219.9 to 50.3 (down by 77.1%). The mortality of patients hospitalized for AMI decreased from 3,794 deaths in 1994 to 1,137 deaths in 2016 (a decrease of 70%); this was due to a lower number of AMI patients admitted for treatment and case fatality decreasing from 17% to 7.5% (down by 55.4%). There was a larger proportion of men among those deceased from AMI; during the analysed period, the mean age of the deceased rose in both sexes (Table 1). Between the years 1994 and 2016, the number of those deceased

Table 1. Trends in AMI incidence, hospitalizations and mortality.

Year	Total number of AMI	Age standardized	% of men	Number of hospitalized for AMI	European standard population	% of men hospitalized	Age standardized	Average age of women hospitalized	Total number deceased for AMI	Age standardized	% of men decease	Average age dof men deceased	Average age of women deceased	Decease during AMI hospitalization	dOther deceased for AMI	Hospital fatality treated AMI
1994	34084	473.2	59.4	22373	299.2	59.5	63.3	70.3	14834	219.9	58.0	68.1	75.5	3794	11038	17.0
1995	32609	449.8	59.4	21682	289.3	59.7	63.4	70.6	13772	202.3	57.7	68.5	75.4	3624	10148	16.7
1996	30544	417.6	59.3	20425	270.7	59.6	63.5	71.1	12797	186.1	57.3	68.2	75.6	3475	9322	17.0
1997	26766	361.9	59.2	18744	246.8	58.7	63.7	71.4	10108	145.4	58.6	68.6	75.3	3089	7019	16.5
1998	27540	370.4	60.0	18177	236.7	60.1	63.9	71.6	11697	167.3	58.5	68.6	75.9	2897	8800	15.9
1999	26841	356.7	59.5	17366	223.1	60.0	63.9	71.6	11847	167.4	57.1	68.6	76.2	2798	9049	16.1
2000	26370	348.8	59.8	17352	222.0	60.1	64.3	72.1	11347	160.1	57.4	69.2	76.7	2796	8551	16.1
2001	26446	349.9	59.6	17985	230.1	60.0	64.5	72.4	10665	151.7	57.0	69.5	76.9	2719	7946	15.1
2002	25617	334.7	60.5	17735	223.7	61.6	64.5	72.6	9807	139.0	56.4	69.4	77.2	2350	7457	13.3
2003	25754	332.8	59.8	18353	230.1	61.6	64.8	72.9	9237	129.0	56.6	69.7	77.0	2378	6859	13.0
2004	25704	326.3	59.7	19351	238.6	60.1	64.9	72.9	8083	112.0	57.0	69.6	77.5	2324	5759	12.0
2005	23628	297.4	60.4	17888	219.0	61.0	65.1	73.3	7352	101.1	56.4	70.2	77.9	2129	5223	11.9
2006	22494	277.7	59.6	17072	205.0	60.3	65.0	73.5	6871	92.8	55.6	70.2	78.7	1948	4923	11.4
2007	22107	266.7	60.9	16870	198.7	62.0	65.1	73.3	6667	87.3	56.1	70.4	78.5	1811	4856	10.7
2008	22006	259.6	60.7	16500	190.2	61.7	65.0	73.7	6789	86.3	56.3	70.4	78.9	1518	5271	9.2
2009	22284	258.5	60.9	16907	191.5	62.1	65.3	73.5	6677	83.6	55.5	71.0	79.3	1510	5167	8.9
2010	21391	242.1	60.5	16253	180.1	63.7	65.1	73.3	6439	78.2	57.0	70.8	79.3	1420	5019	8.7
2011	21430	238.2	62.1	15925	173.1	63.9	64.9	73.4	6774	80.6	57.6	70.9	79.7	1284	5490	8.1
2012	21945	239.4	61.6	16674	178.4	62.9	65.1	73.2	6514	75.9	56.3	71.0	79.7	1251	5263	7.5
2013	21292	228.8	62.7	16141	170.1	64.1	65.6	73.1	6389	73.1	56.8	71.6	79.8	1333	5056	8.3
2014	20437	214.3	63.9	16116	166.1	65.5	65.3	73.2	5476	61.3	57.8	71.6	80.5	1197	4279	7.4
2015	19511	201.4	63.8	15686	159.6	65.2	65.4	73.0	4984	54.6	57.6	71.5	80.1	1154	3830	7.4
2016	19015	192.7	63.9	15419	154.1	65.4	65.3	73.0	4673	50.3	57.6	71.9	80.4	1137	3536	7.5
difference (%, years)	(-) 44.2	(-) 59.3	(+) 7.2	(-) 31.1	(-) 48.5	(+) 9.9	(+) 2	(+) 2.7	(-) 68.5	(-77.1)	(-) 0.4	(+) 3.7	(+) 5.4	(-) 70.0	(-) 68.0	(-) 55.4

Standardized to the European Standard population.

Table 2. Trends in AMI incidence, hospitalizations and mortality according to age.

	Total number of AMI					Persons hospitalized for AMI					Total number of deceased from AMI				
	0-49 years	50-59 years	60-69 years	70-79 years	80+ years	0-49 years	50-59 years	60-69 years	70-79 years	80+ years	0-49 years	50-59 years	60-69 years	70-79 years	80+ years
1994	2971	5040	9734	9690	6639	2379	3805	6717	6110	3352	683	1501	3879	4701	4070
1995	2888	4721	8968	9644	6370	2354	3582	6223	6178	3327	627	1351	3486	4498	3810
1996	2624	4473	8217	9504	5701	2118	3372	5669	6252	2989	597	1306	3209	4274	3411
1997	2225	4150	6939	8697	4752	1810	3253	4987	5952	2739	471	1046	2446	3583	2562
1998	2087	4366	6855	9479	4750	1670	3317	4656	6065	2466	474	1263	2711	4410	2839
1999	2007	4308	6497	9486	4542	1580	3212	4406	5889	2278	478	1289	2621	4629	2830
2000	1908	4211	6061	9322	4867	1518	3168	4197	5956	2512	438	1225	2336	4360	2988
2001	1816	4438	5864	9159	5165	1469	3386	4195	6100	2831	387	1235	2033	4005	3005
2002	1761	4364	5607	8591	5290	1428	3425	4106	5772	3000	380	1084	1827	3577	2939
2003	1731	4361	5585	8470	5602	1487	3427	4112	5944	3378	288	1071	1800	3212	2866
2004	1655	4549	5602	8088	5805	1424	3750	4370	6015	3787	266	939	1538	2698	2642
2005	1535	4012	5206	7292	5581	1339	3317	4129	5464	3637	235	792	1347	2399	2579
2006	1411	3808	5065	6636	5574	1242	3200	4035	4967	3628	200	724	1263	2126	2558
2007	1440	3783	5156	6228	5499	1269	3180	4112	4715	3593	188	696	1269	1987	2527
2008	1407	3600	5309	5981	5707	1225	3001	4141	4513	3618	207	690	1367	1862	2663
2009	1386	3600	5555	5801	5941	1248	3063	4406	4349	3840	159	672	1353	1848	2690
2010	1467	3372	5530	5463	5559	1323	2827	4408	4154	3541	164	633	1345	1674	2623
2011	1467	3263	5730	5332	5635	1313	2753	4467	3931	3458	183	580	1492	1747	2772
2012	1554	3260	5941	5396	5794	1405	2774	4733	4120	3642	168	562	1441	1637	2706
2013	1424	3116	5786	5257	5709	1273	2695	4631	3984	3558	173	484	1382	1607	2743
2014	1527	2953	5635	4989	5331	1407	2597	4691	3936	3483	141	411	1180	1375	2369
2015	1455	2835	5434	4949	4837	1344	2530	4576	3970	3265	140	376	1103	1282	2083
2016	1410	2693	5276	4999	4637	1328	2414	4461	4060	3156	99	345	1015	1265	1949
decrease (%)	52.5	46.6	45.8	48.4	30.2	44.2	36.6	36.5	33.6	5.8	85.5	77.0	73.8	73.1	52.1

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Table 3. Reinfarctions in patients hospitalized for AMI 1994–2016.

Year*	No of primary AMI	No of reinfarctions	Share of reinfarctions (%)	Share of patients in whom in a given period reinfarction occured				
				up to 1 year (%)	up to 2 years (%)	up to 3 years (%)	up to 4 years (%)	up to 5 years (%)
1994	-	-	-	-	-	-	-	-
1995	-	-	-	-	-	-	-	-
1996	-	-	-	-	-	-	-	-
1997	17 198	1 964	10.2	3.8 %	5.6	7.0	8.2	9.4
1998	16 738	1 845	9.9	3.8 %	5.8	6.9	8.0	8.9
1999	15 752	1 978	11.2	3.6 %	5.5	6.6	7.6	8.7
2000	15 678	2 064	11.6	3.8 %	5.5	6.8	7.9	8.8
2001	16 138	2 246	12.2	3.8 %	5.3	6.5	7.7	8.5
2002	15 770	2 349	13.0	3.9 %	5.4	6.4	7.4	8.3
2003	16 257	2 533	13.5	4.0 %	5.4	6.5	7.3	8.2
2004	17 134	2 684	13.5	3.8 %	5.2	6.1	6.9	7.6
2005	15 673	2 549	14.0	3.3 %	4.8	5.8	6.7	7.4
2006	14 892	2 503	14.4	3.3 %	4.6	5.6	6.5	7.2
2007	14 711	2 503	14.5	3.4 %	4.9	6.1	7.0	7.8
2008	14 350	2 526	15.0	3.7 %	5.1	6.1	6.9	7.7
2009	14 530	2 712	15.7	3.6 %	4.6	5.7	6.6	7.4
2010	13 883	2 650	16.0	3.1 %	4.6	5.6	6.4	7.2
2011	13 705	2 490	15.4	3.2 %	4.6	5.6	6.5	7.2
2012	14 272	2 671	15.8	2.9 %	4.3	5.3	6.3	-
2013	13 702	2 681	16.4	2.9 %	4.2	5.3	-	-
2014	13 743	2 683	16.3	2.9 %	4.1	-	-	-
2015	13 299	2 601	16.4	2.4 %	-	-		-
2016	12 960	2 443	15.9	-	-	-	-	-

* Only data for period 1997–2016 evaluated. Data from 1994–1996 we used for assessment wheather the new cases are primary AMI or reinfarction. As reinfarction we considered a new hospitalization for AMI started at least 30 days after the end of previous AMI hospitalization.
Source: National Register of Hospitalizations 1994–2016

from AMI declined in all age groups. The decrease was most pronounced in the age group 0-49 years (by 85.5%!), and least in the age group 80+ (Table 2).

The number of persons dying of AMI outside hospital (at home, at work, in public places or during transportation to hospital) or dying of AMI accidentally in hospital establishments, while not being treated for AMI, decreased from 11,038 in 1994 to 3,536 in 2016 (a decrease of 68% - nearly the same as in the "treated" segment). This may be due to the decreasing AMI incidence and fatality (Table 1).

Trends in subsequent mortality after AMI

The prognosis of patients experiencing an AMI also improved in the 1997–2016 period. The total death rate within one month from the beginning of the first hospitalization for AMI decreased from 16.1 to 9.7%, one-year total mortality from 25.1 to 17.9%, and five-year total mortality from 41.7 to 34%. Even more prononouced was the decrease in subsequent CV mortality: one-month mortality from 15.1 to 8.6%, one-year mortality from 22.3 to 14.2%, and five-year mortality from 34.1 to 23.6% (Table 4). While, during the analysed period, CV disease and CHD in particular remained the prevalent causes of subsequent death, the relative proportion of other causes of death increased. The rate of subsequent mortality after AMI was higher in women than in men; however, the difference disappeared after adjustment for age. Acute and subsequent mortality rates of patients over 75 years of age were about four times those of patients younger than 65 years.

DISCUSSION

Our study presents the nationwide trends in the incidence, treatment, fatality and subsequent mortality of AMI in the Czech Republic in the 1994-2016 period. Unlike several studies focusing solely on the ST-segment elevation myocardial infarction (STEMI) (ref.[1,21,22]) or other specific AMI subpopulations[6], we analysed the long-term trends in both STEMI and non STEMI, both in patients hospitalized for AMI and in the general population.

The annual incidence of AMI decreased rapidly during 1994–1997, to slow down thereafter. The number of persons hospitalized for AMI followed a similar course. The decrease was most pronounced in the age group 0-49 years, and least pronouced in the age group 80+. The incidence of AMI as well as the number of patients hospitalized per year are still higher than in most Western

Table 4. Long term mortality after the first AMI.

Death from any cause (%)				
	1997–2001	2002–2006	2007–2011	2012–2016
1 month	16.1	13.8	11.5	9.7
1 year	25.1	23.1	20.7	17.9
3 years	34.3	32.0	29.7	26.5
5 years	41.7	39.3	37.1	34.0

Death from cardiovascular cause (%)				
	1997–2001	2002–2006	2007–2011	2012–2016
1 month	15.1	12.6	10.3	8.6
1 year	22.3	19.6	17.1	14.2
3 years	28.9	25.6	22.9	19.3
5 years	34.1	30.4	27.4	23.6

European countries, but lower than, e.g., in neighbouring Poland[9]. As a consequence of the decreasing AMI incidence and fatality, overall AMI mortality tended to decline throughout the analysed period. The decrease in AMI mortality was most pronounced in the younger and middle age category (up to 59 years). As the rates of mortality from AMI were very high in this age group in pre-1990 Czechoslovakia, this mortality decline is of particular value. Quite surprisingly, the mortality decrease was nearly the same in patients hospitalized and treated for AMI as well as in those not treated – by 68.5% in total, which is a considerably greater decrease than the decrese in all-cause and CV mortality in the Czech population in that period (by 47% and 61%, respectively). In-hospital AMI fatality dropped by 55.4% and is currently lower than the European average[23]. The total number of reinfarctions per year was increasing until 2004 not to change substantially afterwards. Reinfarctions tended to occur later after the first AMI and their share on all AMI admitted to hospital treatment reached 16.4%, a figure lower than that reported, e.g., in Olmsted county study (28%) (ref.[5]). We used a run-in period, which may actually underestimate the recurrence rate at the start of period we analysed, but this is compensated as our data cover a longer period of time.

Treatment of AMI, especially in-hospital treatment, made impressive advances in the Czech Republic in the period we followed. The interval from the onset of AMI symptoms to hospital admission and interventional procedure shortened. The proportions of successful resuscitation and those of patient survival after resuscitation increased, especially so in recent years and after the introduction of specialized post-resuscitation care and centres. The number of direct (emergent) PCIs rose from 104 in 1995 to 6,958 in 2014 (32.3% of all PCIs performed). While the number of direct PCIs followed an upward trajectory, that of all PCIs per year did not increase after 2006. As shown in our earlier publications, increasing numbers of patients were being treated by antiplatelets, ACE inhibitors, beta-blockers and statins during and after hospitalization for AMI (ref.[19,20]).

Regarding secondary prevention of AMI in the 1995-2016 period, use of beta-blockers and ACE inhibitors or sartans, apparently in the prevention of left vetricular (LV) remodelling, medical treatment with antiplatelet drugs, as well as medical treatment of hypertension and hyperlipidemia became much more widespread and has remained stable in recent years. In men and women total cholesterol and LDL-cholesterol levels decreased intensively and there was a less consistent decrease in average blood pressure and improved arterial hypertension control. However, mostly due to insufficient titration of medicaments to optimaly effective dosage, about half of patients in secondary AMI prevention still do not meet the goals specified by the current guidelines. There has been a reduction in smoking, but the prevalence of obesity, central obesity, sedentary lifestyle and diabetes has increased considerably[19].

As for general population and primary CV prevention, smoking rates decreased only in men while cholesterol and LDL-cholesterol levels have dropped markedly in both sexes. The decrease in average blood pressure and better control of arterial hypertension were less pronounced[19,24]. There was a substantial increase in evidence-based use of cardiac drugs. Given their risk profile, some patients, were being treated by antiplatelet drugs (mostly acetylsalicylic acid), beta-blockers, ACE inhibitors, sartans or lipid-lowering drugs even before experiencing an AMI.

Particularly intriguing is the mortality in the subgroup of patients dying from AMI without being admitted or treated for this diagnosis. Over the 1994-2016 period, no significant difference in the decrease in mortality in this subgroup (down by 68%), compared with patients admitted and treated for AMI (down by 70%) was observed. This can be explained both by the decreasing incidence of AMI, and the general drop in AMI-related fatality. We can presume, that improvements in primary and secondary CHD prevention may be pivotal.

Due to urgent revascularizations and comprehensive medical care, more patients survive AMI with minor myocardial injury and LV remodelling[25]. Given the progress in subsequent medical care, and drug therapy in particular, these developments have translated into adecrease

in subsequent mortality. At present, long-term post-AMI mortality in the Czech Republic is even lower than the European average[23].

Periods of rapid decrease and slower or even zero decrease in AMI incidence and mortality, at least in some age strata, have been reported in several countries[10,22]. In this context, three periods can be distinguished in the Czech Republic: first, simultaneous rapid decrease of AMI incidence and mortality (1994-1997), second, slow decrease in AMI incidence and mortality (1998-2004), followed by a further decrease in AMI incidence and a more pronounced reduction in AMI mortality (2006–2016). The fall in the first period was driven nearly exclusively by lifestyle changes after 1989, particularly in nutrition; in the second phase by progress in cardiovascular treatments[20], whereas the third phase can probably be explained by continuing progress in interventional cardiology, acute coronary care and medical treatment, and slightly better control of some lifestyle risk factors.

The length of hospitalization for AMI shortened considerably during the period followed. This results, partly because of lack of time, in insufficient education of patients towards positive changes in lifestyle and adherence to further treatment. Cardiovascular rehabilitation is carried out on a minority of patients while traditional spa-based cardiac rehabilitation programs are almost exclusively available to patients after cardiac surgery procedures only.

Strengths and limitations

The advantage of our study is the presentation and analysis of nationwide, long-term trends and comparison with repeated cross-sectional studies of secondary CHD prevention. The limitations include absence of personalised data on in-hospital (except interventional) and subsequent health care, as these are not recorded in the current registers. Mortality data were not recorded separately for patients with STEMI and non STEMI. A variable quality of data recorded in specialized interventional cardiac centres and other hospitals can be presumed as well as less accurate data on patients dying outside hospital.

CONCLUSION

In the Czech Republic, 1994-2016, there was an impressive decrease in AMI incidence and mortality and a decrese in long-term mortality after AMI as well. Should this positive trend continue, further improvement in primary and secondary CV prevention is needed.

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