

A pharmaco-economic appraisal of the strategy to tackle the H1N1v (A/California/07/09) pandemic in Italy: relevance of the CIRI-IV surveillance system

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Introduction

Despite preventive measures, every year seasonal influenza epidemics cause illness and death worldwide, even in developed countries. The appearance of the new A/H1N1v (A/California/07/09) virus on the world scene prompted the WHO and other international and national healthcare institutions to draw up and implement strategies aimed at monitoring and containing the spread of this pandemic virus [1]. The Italian system of influenza surveillance (INFLUNET) was promptly potentiated.

Materials and methods

In Italy, about 1200 general practitioners and independent pediatricians send in weekly reports of cases of influenza-like illness (ILI) among their patients (over 2% of the population of Italy) to two National Reference Centers: the CIRI-IV and the National Institute of Health (CNE-SPS). These centers coordinate the activities of sentinel physicians and, after analyzing and processing the data sent in, draw up a weekly report of the epidemiological trend of the disease, which is promptly published in the Italian Clinical Epidemiological Surveillance Web sites [2, 3].

In order to estimate the burden of the influenza pandemic, we examined the epidemiological data collected over the 10 previous seasons.

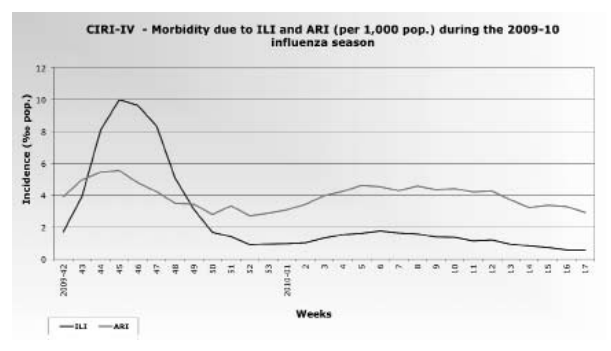
The data reported refer to the activity of surveillance carried out in 9 Italian Regions (which account for about half of the population of Italy) coordinated by the CIRI-IV.

Results

The first case of influenza caused by H1N1v was identified at the beginning of May, 2009. Sporadic cases were identified up to the 38th week of 2009 (the end of summer), when the surveillance system revealed an increase in the incidence of cases of disease among subjects of pediatric age (0-14 years).

The pandemic wave began in the 42nd-43rd weeks of 2009 and reached its peak in the 45th week. (Fig. 1). Considering an epidemic threshold value of 2‰, we can conclude that the phenomenon lasted 7-8 weeks and that in the 45th week the pandemic reached its peak (9.97‰).

Fig. 1. CIRI-IV. Weekly morbidity for ILI and ARI (Acute Respiratory Infections) (per 1,000 inhabitants) during the 2009-10 influenza season.



Stratification of the data on the incidence of infections shows that the most severely affected subjects were those of pediatric age, especially those of school age. Moreover, in this age-group, the pandemic period was much longer (14 weeks) and the peaks of incidence were much higher than among adult subjects (15-64 years): 16.4‰, 34.0‰ and 7.0‰, in the age-groups 0-4, 5-14 and 15-64 years, respectively. Few cases were reported among the elderly.

We estimated the numbers of cases of influenza observed during the pandemic period to be 1,108,477 in the pediatric age-group, 1,374,709 in the 15-64-year age-group and 87,650 among the elderly. If this estimate is extended to the entire 2009-2010 influenza season (28 weeks of surveillance), the figures become 1,823,991, 2,523,363 and 217,582 in the age-groups 0-14, 15-64 and over-64 years, respectively (Tab. I).

Comparison of the data on the 2009-2010 pandemic with those from the previous influenza seasons reveals that the peak incidence was lower than in the 2004-2005 and 1999-2000 seasons. Indeed, the frequency of cases is comparable to that of classic seasonal influenza of moderate intensity. Nevertheless, the pandemic unfolded in a very short time.

We have estimated the costs of the influenza seasons from 1999 to 2010. These costs have been calculated on the basis of the epidemiological data, the unit cost per age-group (€ 212, € 731 and € 1,041 for the age groups 0-14, 15-64 and ≥ 65 years, respectively) and the purchasing power of the Euro (PPC) [4-6]. In Italy, the total costs attributable to influenza in the seasons 1999-2008 amount

Tab. I. Estimates of the total number of influenza cases in Italy during the epidemic peak.

Influenza season	Epidemic period	Length (weeks)	0-14 yrs	15-64 yrs	≥ 65 yrs	Total in epidemic period	Total in influenza season
1999-00	Dec-Feb	10	785,545	2,840,322	400,295	4,026,162	4,890,280
2000-01	Jan-Feb	7	769,398	906,098	69,195	1,744,961	2,484,888
2001-02	Jan-Mar	10	1,085,297	1,485,351	161,766	2,732,415	3,431,394
2002-03	Jan-Mar	10	1,205,461	1,971,888	293,855	3,471,204	4,362,441
2003-04	Jan-Mar	11	634,396	1,179,531	157,851	1,971,778	2,747,624
2004-05	Dec-Mar	12	1,250,203	2,693,302	441,689	4,385,195	5,009,445
2005-06	Jan-Mar	4	187,435	261,696	27,766	476,897	1,858,832
2006-07	Jan-Mar	8	634,138	1,102,093	139,810	1,876,041	2,709,480
2007-08	Jan-Mar	11	842,994	1,550,515	194,510	2,588,019	3,302,091
2008-09	Jan-Mar	9	629,061	1,282,537	179,961	2,091,559	2,890,422
2009	-	-	27,881	91,997	10,876	130,754	576,144
2009-10	Oct-Dec	7	1,108,477	1,374,709	87,650	2,570,836	4,041,383

to approximately € 15 billion (mean cost per season: € 1,355,565,004). These costs have been calculated on the basis of the total numbers of cases observed during the seasonal epidemics; they therefore underestimate the true economic burden. Indeed, if the total number of cases occurring during the entire influenza seasons were to be considered, the total cost over the 10 seasons would rise from € 15 billion to € 20 billion.

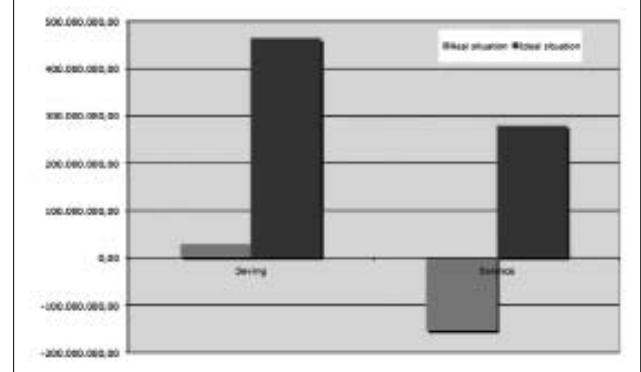
In the 2009-2010 influenza season, the economic burden was about € 1,361,000,000 during the pandemic period and about € 2,300,000,000 for the entire season.

To these costs, we also have to add the costs of the vaccination campaign (purchase of 24 million doses of vaccine = € 184,800,00).

Less than 1 million (925,000) doses of vaccine were administered during the vaccination campaign. The benefit derived from the administration of these 925,000 doses was equivalent to about € 18 million (cases of influenza avoided = 35,413); this means a negative balance of € 166,789,088. (Fig. 2).

In an ideal situation, in which all 24 million doses would have been used (8,428,708 for pediatric subjects and 15,571,292 for adults), about 1,180,882 cases of influenza could have been avoided (a cost saving of about € 462,680,367), which means a positive balance of about € 278 million.

Fig. 2. Real saving (on the basis of vaccine doses used), ideal saving (if all vaccine doses had been used) and balance of the vaccination campaign conducted in Italy against H1N1v virus.



Conclusions

The 2009-2010 influenza pandemic proved to be comparable to other influenza seasons of moderate intensity. Nevertheless, evident difficulties and shortcomings can be seen in the management of the pandemic. The information campaign was insufficient to clarify the potential severity of the pandemic; doctors did little to promote vaccination, and distribution of the vaccine was delayed. These were the main factors responsible for the inadequate management which led to a negative balance of the vaccination campaign.

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