INTRODUCTION

Since mid-eighties a novel and unexpected immigration phenomenon occurred in Italy, which during the subsequent years substantially acted on the entire social context. A broad spectrum of cultural, social, economical, and health care modifications occurred recently, after extensive immigration waves interesting our country which found our institutions somewhat untrained to face all related variables, related to the extent of this immigration phenomenon, which brought to Italy an estimated number of three million people, with around 400,000 of them remaining for a long period in a clandestine status [1].

It is usually estimated that the majority of migrant people has not relevant health problems upon leaving their country of origin [2]. Although at the time of departure no physical disturbances are usually present, however these subjects have been probably exposed to diseases (either infectious in origin, or not), which could have left some consequence (i.e. primary tuberculosis, “chronic” malaria, intestinal parasite infections). These health concerns are strictly correlated to the specific area of origin, so that a broad spectrum of variables should be carefully considered, when assessing both the migration phenomenon, and the single foreign citizen. In our opinion, we cannot identify a unique “migrant type”, from a health care, social, economic, and anthropologic point of view. Several different features are typical of each immigrant, and they are generally consistent with the area of origin (i.e. the Balkans, Latin America, Far East, different African regions), and the former social-economical position. Other differences emerge after the immigration process, strictly related to the life and working project to be carried in Italy (i.e. re-joining local communities of former immigrants, search for regular work, versus clandestineness and illicit activities). These concepts need to be further emphasized, overcoming the limited, schematic and stereotyped perspective of “the immigrant” to a Western country. As a consequence, a “standardization” of all social-medical approaches proves inappropriate and probably impossible to be implemented.

Infectious diseases, initially estimated as a potential, prominent problem in these migrant populations, are actually represented with very contained prevalences, compared with the overall morbidity and their very large clinical spectrum of presentations. According to a 2004 Italian survey [2] regarding infectious diseases which led to hospitalization of immigrants, HIV infection ranked first with 17% of cases, followed by tu-
berculosis (12%), viral hepatitis (12%), and malaria (4%). As a whole, infectious diseases accounted for less than 10% of overall disorders which led the examined subjects to hospital admission [2].

In a general perspective, we aimed to make a comprehensive assessment of all diseases involving hospitalizations of foreign patients (coming from extra-European Union developing countries) during the last six years, including both infectious and the more frequent non-infectious illnesses.

**PATIENTS AND METHODS**

The metropolitan area of Bologna (Italy) and its province at the end of year 2002 had an overall living population of 927,820 registered people, with 373,592 inhabitants in the town area of Bologna (downtown district). Foreign citizens officially resident in Bologna and province were 39,186 (4.2% of the whole population), with people coming from Northern Africa as the leading community (31.5%), followed by Eastern Europe (22%), Far East (12.9%), Indian subcontinent (11.3%), sub-Saharan Africa (7.4%), Latin America (4.6%), and Middle East (2.1%). Foreigners coming from developed countries represented a cumulative 8.2% of cases. In the year 1993, foreign citizens living in Bologna represented only 1.6% of total population, but ten years later (2002) this rate rose to 4.8%. On the other hand, in the Bologna province foreigners passed from 1.1% to 3.9% during the same time period [3].

In the year 2003, when considering separately persons coming from developing countries compared with general population (autochthonous citizens, plus people coming from advanced areas of the world), the percentage was 5.2% in Bologna town, and 4.7% in the remaining Bologna Province. In the Bologna town, over 75% of foreign citizens are aged 40 years or less; when compared with overall population aged until 40 years, it accounts for the 39.4%. In fact, the mean age of Bologna residents is around 47 years (five years more for females versus males), while foreigners are aged around 30 years on average, in absence of significant gender differences. Children and young people with less than 18 years represent the 20.8% of foreign residents in the Bologna town area, while their frequency rises to 27.1% in the remaining Bologna Province.

On the basis of these evolving demographic data, a comprehensive survey on hospitalizations was carried out in the most important teaching Hospital of Bologna (S. Orsola-Malpighi Hospital, an over-1,800-bedded facility), in order to indirectly assess the prominent health problems of immigrants, by looking at admissions, discharge diagnoses, and their multiple correlates.

All electronic clinical and laboratory charts of our Hospital were retrospectively evaluated, in order to extract all information regarding the overall foreign patients admitted as inpatients at all Hospital Divisions, in the period ranging from January 1, 1999, up to December 31, 2004. Both the “diagnosis-related groups” (DRGs) related to each admission, and the related discharge diagnoses, were carefully examined and compared. Later, we focused our attention on medical diagnoses pertaining to infectious diseases. All patients followed for a clinical picture including organ-specific or non-organ-specific infectious diseases were enclosed in our analysis, regardless of their Division(s) of Hospital admission.

Statistical data analysis was performed with electronic programs belonging to the SPSS 12.0 software package, relying on usual indicators of frequency synthesis, and hypothesis testing like Pearson and McNemar chi-square test, and Fisher exact test, with significant p values posed at p<.05.

**RESULTS**

All admissions of extra-European Union citizens carried out at the S. Orsola-Malpighi teaching Hospital of Bologna (Italy) were assessed, with reference to the period ranging from January 1999, to December 2004. Among foreign citizens, besides those coming from the European Union, patients coming from S. Marino Republic, United States, Canada, Israel, and Australia, were excluded from evaluation. As a result, our investigation was conducted only on patients coming from developing countries, which accounted for 7,247 overall hospitalizations. This preliminary report is devoted to the analysis of adolescents and adults only (aged 14 years or more), whose hospital admissions were 6,003 in number. During the six-year observation period, female admissions had a steady increase, with a major peak registered in the year 2002 (chi square 123.389; p<.001); this significant trend is attributable to the rise of number of hospitalization of women coming from Eastern Europe (chi square 1680.742; p<.001). Such an increase was not observed among the male population. The hospitalization of female patients occurs at a signifi-
cantly younger mean age (30±11 years), compared with that of male subjects (mean age 35±14 years) (Student t test value -14.675; *p*<.001).

The admission of clandestine (irregular) patients, carried out with emergency features (the sole possibility to deliver free assistance at public Hospitals in Italy), accounted for 9.4% of cases. This phenomenon was very frequent in the year 1999 (43% of overall admissions), but rapidly declined during following years (10% in the year 2000, 7% in the year 2001), leading to a dramatic reduction since 2002 (chi square 1908.79; *p*<.001).

This tendency (matched between males and females), strongly depends on an appropriate deed of indemnity Italian law, which allowed to overcome this unfavourable situation.

In order to analyze with greater detail all epidemiological figures available in the diagnosis-related group (DRG) electronic database of our Hospital, we also took into careful account of all the different clinical diagnoses of discharge, which were often multiple for each single admission. In particular, two different diagnoses were found in 20.6% of discharges, three diagnoses in 9.2% of cases, four diagnoses in 4.1% of hospitalizations, and five or more diagnoses in 2.3% of overall discharges. As a consequence, 7,231 different diagnoses originated from registered information regarding 6,003 Hospital discharges (a 17% increase compared with the number of each single hospitalization).

The analysis of hospitalization causes among women showed that the predominant discharge diagnoses were the obstetrical-gynaecological ones: voluntary pregnancy interruption, spontaneous abortion or pregnancy complications leading to abortion in 30.6% of cases, and childbirths or controls of pregnancies with a favourable outcome in 18.2% of events. These last diagnoses covered nearly one half of the “need of hospitalization” of our examined extra-European Union women. Among female patients, the remaining admissions were due to organic, dysmetabolic, or functional disorders, leading to degenerative and/or chronic illnesses in 18.8% of cases. On the other hand, infectious diseases (4.6%) and trauma-related hospitalizations (2.2%), were not particularly frequent.

From a social and public health point of view, by 2002 the Italian law concerning the clandestine immigrants produced very relevant changes just in the obstetrical-gynaecological setting: over 50% of women hospitalized for delivery or abortion were clandestine in the year 1999, while in the year 2003 only one case of obstetrical hospitalization of a clandestine woman was seen (*p*<.0001). The temporal trend of compared deliveries and abortions (either spontaneous or voluntary) concerning extra-European Union immigrant women is also interesting (Table 1). Such a situation was not observed in the subset of female immigrants coming from Eastern Europe, where an opposite temporal trend was observed, as summarized in Table 2. In fact, an odds ratio for abortions between women from Eastern Europe and women immigrating from all other remaining extra-European Union countries of 1.62 (C.I. 1.37-1.93), was calculated, and Figure 1 depicts the trend of overall abortions and childbirth deliveries in this last subpopulation of immigrant, pregnant women, compared with overall foreign childbearing women admitted at our Hospital.

<table>
<thead>
<tr>
<th>Year of hospitalization*</th>
<th>Voluntary pregnancy interruption, spontaneous abortion, pregnancy complications leading to abortion</th>
<th>Childbirth delivery, or controls in pregnancies not at risk for abortion</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>110</td>
<td>99</td>
<td>1.0</td>
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<tr>
<td>2000</td>
<td>107</td>
<td>126</td>
<td>0.76</td>
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<tr>
<td>2001</td>
<td>197</td>
<td>179</td>
<td>0.99</td>
</tr>
<tr>
<td>2002</td>
<td>207</td>
<td>439</td>
<td>0.42</td>
</tr>
<tr>
<td>2003</td>
<td>188</td>
<td>378</td>
<td>0.45</td>
</tr>
<tr>
<td>2004</td>
<td>102</td>
<td>311</td>
<td>0.30</td>
</tr>
</tbody>
</table>

*Chi-square test per trend = 81.135, with *p*<.001.
This last figure becomes particularly significant when considering that immigration waves from Eastern Europe to Italy became massive only after the year 2002.

Among men, registered discharge diagnoses were predominantly related to dysmetabolic disorders, organic or degenerative diseases with a chronic course, or functional illnesses (36.2% of cases), which proved significantly more frequent compared with women \((p<.001)\), as well as post-traumatic diseases (16.5% of all discharges) and infectious diseases (12.1% of cases) \((p<.001)\). Trauma secondary to street and work accidents or violence episodes, proved particularly frequent among male patients. While until the year 2002 these discharge diagnoses predominantly regarded all irregular immigrants regardless of their citizenship \((\text{chi square} 96.66; p<.001)\), during subsequent years these events became significantly more frequent among subjects coming from Northern Africa (27.9%) and Eastern Europe (13.6%).

Interestingly, 9% of women and 8.9% of discharges of extra-European Union patients were due to diagnoses related to frank psychiatric disorders (schizophrenia, severe personality disturbances), or linked to social-cultural problems, and the subsequent disturbances (alcoholism, drug addiction).

Degenerative, dysmetabolic, and chronic diseases (e.g. ischemic cardio-myopathy, uterine fibromatosis, ovarian diseases, arterial hypertension,

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**Table 2 - Temporal trend of deliveries and abortions (either spontaneous or induced), interesting extra-European Union immigrant women, coming from Eastern Europe.**

<table>
<thead>
<tr>
<th>Year of hospitalization*</th>
<th>Voluntary pregnancy interruption, spontaneous abortion, pregnancy complications leading to abortion</th>
<th>Childbirth delivery, or controls in pregnancies not at risk for abortion</th>
<th>Odds ratio</th>
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<tr>
<td>1999</td>
<td>1</td>
<td>4</td>
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<tr>
<td>2000</td>
<td>1</td>
<td>2</td>
<td>2</td>
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<tr>
<td>2001</td>
<td>31</td>
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<td>2.53</td>
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<td>2002</td>
<td>185</td>
<td>82</td>
<td>9.02</td>
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<td>201</td>
<td>93</td>
<td>8.65</td>
</tr>
<tr>
<td>2004</td>
<td>218</td>
<td>66</td>
<td>13.21</td>
</tr>
</tbody>
</table>

*Chi-square test per trend = 32.317, with \(p<.001\).
diabetes mellitus, arthrosis, collagen vascular disease, and endocrinological disorders), proved proportionally more frequent among subjects coming from Eastern Europe compared with all other remaining extra-European Union migrants: the rate of disease occurrence was 36.2% among males (p<.001), and 18.8% among women (p<.02, Fisher exact test). In this disease group, cardiovascular disorders (25.8% of discharge diagnoses), prevailed over female reproductive diseases (18.9%), and gastrointestinal disorders (15.4%). Also "generic", not well characterized or undefined diagnoses were proportionally numerous (470 cases: 6.6% of overall discharge diagnoses). They included abdominal pain, fever, and headache, of apparently unknown origin. We strongly believe that in these last circumstances and/or language deficiencies strongly affected the physician-patient relationship, and were probably responsible for the unsuccessful diagnostic process. Discharge diagnoses related to psycho-social discomfort, difficult communication due to language and cultural barriers, or simply disorders which did not deserve further investigation, were significantly more frequent among irregular (clandestine) immigrants (11.1% versus 6.1% of regular extra-European Union individuals). The risk to face these problems proved significantly more frequent in the clandestine population, when stratifying patients according to Mantel-Haenszel test assessed per year of discharge (in order to avoid biases related to the very low number of irregular immigrants hospitalized since the year 2002), with an OR of 1.3 (with C.I.50% ranging from 1.1 and 1.6).

Discharge diagnoses connected to infectious diseases were significantly more frequent among men compared with women (12.1% versus 4.6%; p<.001). The main identified etiological agents were: Mycobacterium tuberculosis (14.9% of discharges), HIV (7.1% of cases), HBV (3.3% of discharges), and HCV (2.6% of cases). Moreover, in 3% of cases an unspecified bacterial aetiology was found, and another 3% of discharges included skin and soft tissue infections. The upper and lower airways represented the most involved organ system (recognized in 45% of discharges), followed by the gastrointestinal tract (16.4% of cases), and skin and soft tissues (7.4%), while systemic infections were found in 14.9% of hospital discharge diagnoses. The evidence that such disorders were predominant (up to 90% of cases) among non-regular extra-European Union citizens during the years 1999 and 2000 is of particular interest in the field of prevention and management of infectious diseases of immigrants. During subsequent years, no significant variation was observed in the frequency of these diseases, which seem to predominate among Asian immigrants (ranging from 10.7% to 19.3% in the examined period). After the year 2002, a substantial increase of infectious diseases among subjects coming from Eastern Europe was observed, which accounted for a 18-35% rate of overall diagnosed infectious diseases. From an health care and social perspective, although a reduced incidence of infectious illnesses did not occur during time, the possibility to attribute them to patients of ascertained identity and housing, makes possible to trace index cases, towards well-planned and effective therapeutic and preventive interventions.

**DISCUSSION**

Because of its occupational perspectives, and the favourable social and receptive environment, the Bologna metropolitan area located in North-Eastern Italy represents an attractive pole for immigrants, who therefore tend to find a fixed residence. Data from our area show that the most important foreign communities living in the Bologna area come from Morocco, Albania, and Philippines, followed by Tunisia and China [3]. Among Bologna immigrants, proportionally young people largely prevail, represented by subjects in their working and reproductive years (age 20-44 years), and children (aged 0-6 years), the majority of them being born in Italy. The demographic features of this composite population significantly influence the retrieved hospitalization and disease spectrum, which tests remarkably different from that of autochthonous population, which is significantly older, and consequently suffers from a greater prevalence of vascular, degenerative, and oncological illnesses.

In our experience, only a limited percentage of hospitalized foreign citizens (around 10-12%) suffered from primary (predominant) infectious diseases-related illnesses, as recorded in the discharge forms. This percentage matches the figures reported from other Italian regions [2]. Among infectious disorders, the major role of HIV infection [4-6], viral hepatitis [2, 4, 7], sexually-transmitted diseases [8], and malaria [2, 9, 10], is confirmed by our data, too. Provided that many adult patients with infectious diseases had multiple discharge diagnoses and multiple DRGs, and that infectious disorders could co-exist with non-infectious ones, misclassification and discrepancy
between the actual infectious diseases presented by patients, and their DRG scores and discharge diagnoses, may be particularly evident for lower airways, gynaecological, and ear, nose and throat infections, as well as non-organ specific infectious diseases. On the reverse side, when infectious diseases DRGs were recorded and analyzed, also psychiatric comorbidity and psycho-social discomfort proved frequent concomitant conditions, thus confirming the weight of social distress among foreign immigrants. All these data and related indications could be extremely useful in order to correct the “weight” of infectious diseases among hospital admitted patients, taking into better consideration subjects with frequent comorbidity and relevant diagnostic-therapeutic engagement (and related, relevant expenses).

Our in-depth analysis of all hospitalizations of foreign patients occurred during the last six years in the teaching Bologna Hospital, allows us to trace several hints and indications, although limitations are expected from the retrospective study design, essentially based on the elaboration of data coming from electronic databases of demographic, clinical, and outcome features of evaluated subjects, which often include a “mismatch” between discharge diagnoses and attributed DRGs.

Our study population predominantly included proportionally young subjects, with numerous admissions associated with delivery and other obstetric-gynaecological problems (i.e., voluntary pregnancy interruption, abortion, or childbirth and subsequent controls). The male subjects demonstrated a significantly lower tendency towards hospitalization, and this was particularly true for northern Africans; in this last population, traumas and injuries are among the leading causes of admission, as also shown by another Italian experience [11].

A predominant role of psycho-social disturbances is also confirmed: while their occurrence may precede immigration, most of these problems are usually triggered or exacerbated by a large number of inconveniences directly or indirectly related to the migratory process, and often may conditionate or complicate the underlying organic diseases. Traumatic causes predominate among men, however non-organ specific infectious disorders, and respiratory tract, liver, and gastrointestinal infections proved proportionally frequent in our population.

Since immigrants are predominantly young and otherwise healthy, hospitalizations tend to be short in duration, and not infrequently end with voluntary discharge (as a possible expression of personal or environmental discomfort, reduced compliance to both hospital environment and rules, and/or the lack of a cultural concept of prolonged disease). Depending on these data, the next future could be interested by a worrying increase of young people illnesses (also including drug and alcohol abuse), among sons of immigrants born in Italy, due to predominant psycho-social determinants which remarkably emerge in some minorities. The history of the HIV pandemic and that of hepatotropic viruses (HBV and HCV) demonstrated a rapid spread of these communicable, infectious diseases through addiction, and people with diffuse psycho-social discomfort [6, 12-15]. Given the present epidemiological trend, traumatic illnesses might also increase their frequency, considering the possible supporting role of alcohol or drug use among temporary male workers or those relying on a temporary job.

In conclusion, our preliminary assessment seems to show that a rapid modification of health care assistance of extra-European Union citizens migrated from developing countries to Italy, occurred during the past six years (1999 to 2004), while profound differences are highlighted according to patient’s gender (males versus females), and related disorders. Also a recent multicentre study realized in the setting of Italian divisions of infectious diseases confirmed our previous single-centre observations [16, 17]. In fact, HIV infection (378 cases), tuberculosis (303), viral hepatitis (282), gastrointestinal diseases (196), and respiratory disorders (177), as the leading cases of admission of 2,255 foreign, immigrated patients observed in 46 different Italian Infectious Diseases wards [16].

A continue availability of adequate cultural mediators who could help understanding the health care needs of these disadvantaged patients is mandatory, and a competence beyond the simple language aid is expected. Furthermore, a first-line health care assistance network should be appropriately strengthened, by organizing primary care and multi-specialist outpatient services easily accessible to immigrants, in order to offer immediate help, and avoid an inappropriate resort to Emergency Rooms and hospitals admissions. In particular, the organization of specialized obstetric-gynaecological consulting-rooms should be urgently set up, to support female immigrants in caring their health, and operating a family-planning counselling aimed at following women and their family, and avoiding undesired pregnancies and the frequent resort to medical-assisted abor-
which may allow a significantly increased level of attention towards different at-risk situations, starting from the availability of dedicated social-health care territorial structures, the implementation of consulting services specifically devoted to foreign and immigrant citizens, and outpatient health care centres which may precociously disclose emerging discomforts and minor health care problems, giving an immediate aid to patients, and concurrently avoiding the resort to hospital centres and emergency services.

Key words: developing countries, non-EU citizens, health care needs, immigration, survey.

**SUMMARY**

Hospitalizations of foreign patients from developing countries outside the European Union were examined for the period 1999-2004, focusing on infectious diseases and on pregnancy issues. Patients over 14 years old had 6,003 admissions, leading to 7,231 overall diagnoses. During the 6-year study period, female hospitalizations increased steadily, with a peak in 2002 ($p<.001$). This trend was mainly due to the rise in women from Eastern Europe ($p<.001$), which occurs at a younger mean age versus that of males ($p<.001$). Admission of illegal immigrants, performed on an emergency basis, accounted for an average of 9.4%. This phenomenon was very frequent in 1999 (43% of admissions), but dropped sharply after 2002 ($p<.001$), caused by changes in Italian law. The prevalent women diagnoses were ob/gyn ones: voluntary pregnancy interruption, spontaneous abortion or pregnancy complications in 30.6% of cases, and childbirths or controls of pregnancies with a favourable outcome in 18.2% of patients. Among men, dysmetabolic disorders and organic-degenerative diseases were more frequent versus women ($p<.001$), as well as post-traumatic diseases (16.5%), and infectious illnesses (12.1%; $p<.001$). Also generic-undefined diagnoses were proportionally numerous (6.6%): cultural-language deficiencies affected the physician-patient relationship. Among infectious diseases, the main causative organisms were *Mycobacterium tuberculosis* (14.9%), HIV (7.1%), HBV (3.3%), and HCV (2.6%). Upper-lower airways represented the most involved organ system (45% of discharges), followed by the gastroenteric tract (16.4%), and skin-soft tissues (7.4%), while systemic infectious diseases accounted for 14.9% of episodes. Such disorders predominated (up to 90% of cases) among non-regular migrants during 1999-2000, while after 2002 an increase in infectious disorders was observed among patients from Eastern Europe. From a health care-social perspective, although a reduced incidence of infectious diseases did not occur, the possibility of attributing them to individuals of ascertained identity and housing makes it possible to trace index patients, and ultimately strive towards well-planned and effective therapeutic-preventive interventions.

**RIASSUNTO**

inferiore rispetto alla media dei soggetti di sesso maschile (p<0,01). Il ricovero di pazienti in stato di clandestinità, effettuato in regime di emergenza, pesava mediamente per il 9,4%. Tale fenomeno era molto frequente nell’anno 1999 (43% delle ospedalizzazioni, ma subiva un netto decremento a partire dall’anno 2002 (p<0,01), per lo più a seguito degli effetti delle modifiche normative di legge italiane. Tra le patologie diagnosticate nelle pazienti di sesso femminile, prevalovevano quelle della sfera ostetrico-ginecologica: interruzione volontaria di gravidanza, aborto spontaneo o complicazioni della gravidanza nel 30,6% dei casi, e parti o controlli in gravidanza con esito favorevole in un ulteriore 18,2% degli episodi. Queste diagnosi riguardavano il 50% circa delle ospedalizzazioni delle donne immigrate; altri ricoveri erano dovuti a patologie organiche, dismetaboliche o funzionali, mentre minor frequenza presentavano le affezioni ad ecologia infettiva (4,6%). Tra i pazienti di sesso maschile, le patologie dismetaboliche, le malattie organico-degenerative, e le affezioni funzionali risultavano prevalenti (36,2%), e significativamente più frequenti di quanto registrato nel sesso femminile (p<0,01), così come le patologie post-traumatiche (16,5%), e quelle di natura infettiva (12,1%; p<0,01). Ancora una volta, le diagnosi generiche o mal definite risultavano relativamente numerose (6,6%; evidentemente, problematiche culturali e linguistiche ostacolano il rapporto medico-paziente. Tra le malattie infettive, i microorganismi più frequentemente in causa erano rappresentati da Mycobacterium tuberculosis (14,9%), HIV (7,1%), HBV (3,3%), ed HCV (2,6%). Le vie respiratorie superiori ed inferiori costituivano l’apparato maggiormente coinvolto (45% delle diagnosi di dimissione), seguite dal tratto gastrointestinale (16,4%), e dalla cute e dai tessuti molli (7,4%), mentre infezioni al interessamento sistemico si verificavano nel 14,9% degli episodi complessivamente registrati. Tali distruzioni predominavano (fino a costituire oltre il 90% dei casi) tra gli immigrati non regolari nel corso del biennio 1999-2000, mentre dopo l’anno 2002 un incremento di patologie ad ecologia infettiva veniva osservato tra i pazienti provenienti dall’Est Europeo. Conclusioni. Da un punto di vista assistenziale e socio-sanitario, sebbene non si sia assistito ad una riduzione di incidenza temporale delle patologie infettive, la possibilità di attribuirle ad individui di identità e domicilio riconoscibili, rende possibile tracciare i pazienti-indice, e pianificare interventi terapeutici e preventivi efficaci.

**References**


