Materiali e documenti

Human mobility, health inequity and needs

The experience through the Emergency Departments of the metropolitan area of Rome (EMAHM)

a cura di
Giuliano Bertazzoni, Corrado De Vito, Silvia Iorio, Armando Montanari

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Introduction

This booklet brings together the products of the research published in recent years in various national and international journals from different backgrounds and areas of study by the interdisciplinary EMHAM group on the relationship among human mobility, health and fairness.

Overall, the studies develop a framework around the phenomenon of migration in its complexity and multifactorial aspects by raising arguments that allow for a fruitful comparison and analysis of quantitative data, in this case Big Data, and historical political economic circumstances as well as the relationship with qualitative and observational data. The noteworthy speed with which the intensity and characteristics of human mobility change are comparable with that of financial markets. Moreover, people now have the opportunity to receive information about events as they occur. Along similar lines, the information used in the field of socio-demographic research is also acquired in real time thanks to the large amounts of data circulating on the internet. Furthermore, human mobility has already changed the demographic structure of the countries, and these changes involve not only the demographic and social aspects of the different countries but also healthcare processes. The latter manifest themselves explicitly within those Emergency Departments where we observe phenomena that would remain – or might remain – hidden elsewhere. We have to only think about the displacement of people who escape the control models of the different countries considered as migratory destinations. Specifically speaking, the data and information on the health and healthcare needs of foreign populations who visited the emergency departments of the major hospitals of the Rome Metropolitan Area, (Policlinico [General Hospital] Umberto 1°, Policlinico di Tor Vergata, San Camillo Forlanini Hospital, San Giovanni Hospital, Sandro Pertini Hospital) from 2000 to 2014, highlight important viewpoints and aspects. This information, if used properly, could facilitate the development of simulation models as detectors or sensors for the actual system, eventually leading to the planning of actions that can act as support to prevent the ER from becoming the epicentre of the healthcare system. The studies used in our work have analysed the changes in access to the ER over the years, also reporting the political, environmental, social and economic conditions of the countries of origin. There are more than 5,000,000 visits, of which 8% - totalling over 400,000 people – from non-European countries. Furthermore, these studies allowed our group to analyse the main reasons for their access to Emergency Departments, observing variations based on the context of origin (Mediterranean basin, Central and Eastern Europe, Southeast Asia) and the living conditions of these patients. Through the identification of the prevalent pathologies, we were able to delineate a geography of the morbidity and mortality in the area of Rome.

The data are being assessed, and will continue to be studied, based on: (1) the change over time admissions by nationality; (2) the frequency of visits by country of origin; (3) the

distribution of the population by age and sex through the evaluation of diagnostic codes, according to the international classification of diseases (ICD-9); (4) the relationships between demographic variables and diagnostic parameters using statistical models. These studies, carried out in the largest hospitals in the Rome metropolitan area, allow for: 1) an assessment of over a million data and information regarding to admissions to the ER by foreign patients; 2) the identification of health needs of foreign citizens and their evolution; 3) the change over time of these health needs; 4) the possibility to plan treatment and prevention for these needs, involving the NHS and the reference facilities for foreign citizens. The analysis of collected data and pertinent results can provide an image of the strengths and weaknesses of healthcare services; moreover, through the observation of the diseases for populations from specific nationalities, the studies could lead us to new healthcare policies, adapting them to immigration and migration. However, the results highlight also the need to link these data with other information sources, including those from the databases of local health services, social services (in the specific case of vulnerable people), justice services (in the specific case of victims of violence and abuse), education services, etc. An important fact regarding some categories of migrants concerns emerging health needs that are certainly different from those traditionally assigned to them - such as infectious diseases – today focusing also on chronic and degenerative diseases of an aging population.

This indicates and draws attention to the need to produce adaptations and changes in services. In particular, there is the need to produce effective health policies that are sensitive to migrants and no longer fragmented into local, regional and state regulations. Overall, foreign citizens residing in Italy still have a health advantage over the Italian population: this fact forces Italian health services to ask themselves some important questions in terms of prevention, in order to prevent this advantage from declining or worsening due to the socio-economic conditions of migrants. The latter are considered the real aetiology referable to the problems and health behaviour of the migrant population. Therefore, it is essential to safeguard these health assets through actions that can move on different levels of society and services. The use of ER Big Data can certainly improve the global health care system. However, even more, by using this amount of data within an interdisciplinary perspective and viewpoint, these data can act as a compass for healthcare policies, facilitating their development in a of evidence-based health care systems.

Using these considerations as a foundation, the need to disseminate the results of the study emerged with a view of progress in order to carry out planning in the immediate future. The investigation of the information produced by the Emergency Departments of the Rome Metropolitan Area has proved to be strategic in identifying the healthcare needs of foreign populations. In fact, many of the dynamics concerning migrants can be traced back to the inappropriateness of visits and accesses to the Emergency Departments. These unnecessary visits provide us with information that can help us identify shortcomings and critical issues within the primary care system and, more generally, in the management of psycho-social and socio-economic support. Lastly, this information, together with the result of dynamic evaluations and assessments, is useful not only for healthcare issues, but also for the demographic, socio-political and economic characterisation of the phenomenon of human mobility.

Il Pronto Soccorso come osservatorio della mobilità umana invisibile: il caso del Policlinico Umberto I

Source: Bertazzoni G., Garramone A., Londei A., Montanari A., 2016, Il pronto soccorso come osservatorio della mobilità umana invisibile: il caso del Policlinico Umberto I. In P. Magistri (a cura di) Geografia e Nuovo Umanesimo, UniversItalia.

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IL PRONTO SOCCORSO COME OSSERVATORIO DELLA MOBILITÀ UMANA INVISIBILE: IL CASO DEL POLICLINICO UMBERTO I

Introduzione

Il mondo della ricerca in Medicina in questi ultimi anni ha registrato grandi progressi soprattutto grazie alla tecnologia. Le grandi compagnie e i grandi progetti di ricerca hanno a disposizione bilanci rilevanti per scoprire nuove molecole o farmaci ad alto contenuto di innovazione in grado di adattarsi alla mappa genetica di ciascun individuo. Una ulteriore metodologia è quella di utilizzare i "Big Data" che sono già a disposizione ma che finora non sono ancora stati utilizzati. Di seguito si presenta uno studio di fattibilità in corso di sperimentazione presso il Policlinico Umberto I di Roma grazie alla collaborazione dei Servizi Informativi dell'Azienda Policlinico Umberto I e i Dipartimenti di Medicina Interna e Specialità Mediche e di Studi Europei, Americani e Intercul-

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turali della Università La Sapienza di Roma (Bertazzoni B., Bertazzoni G., Montanari, 2015; Bertazzoni *et alii*, 2016). L'obiettivo della ricerca è quella di valutare le caratteristiche e l'andamento delle patologie relative agli accessi al Dipartimento di Emergenza da parte di cittadini di nazionalità non italiana: Romania (61.943), Bangladesh (16.201), Perù (10.136), Cina (8346), Polonia (8.237), Albania (7.945), Egitto (7.628), Filippine (6.804), Marocco (6.614). Uno studio retrospettivo è stato effettuato su pazienti transitati per il Pronto Soccorso (PS) del Policlinico Umberto I nel periodo compreso tra il gennaio 2000 e il dicembre 2014. Sono stati estratti pazienti non di nazionalità italiana inserendo nella nostra banca dati: età, sesso, motivo dell'accesso e la diagnosi finale identificata secondo la codifica internazionale delle malattie. Lo studio ha preso in esame i gruppi etnici maggiormente presenti nella città di Roma ed ha evidenziato l'insorgenza di patologie che nei casi considerati avviene per un'età media molto inferiore a quella usuale nei Paesi europei. Gli accessi totali al PS del Policlinico Umberto I, periodo 2000-2014 (mese di giugno), sono stati 1.908.240, di questi 1.651.621 italiani e 256.619 stranieri.

La ricerca ha permesso di riflettere sulla tipologia delle patologie presentate dai pazienti di ciascuna etnia e in particolare le cause genetiche, l'interazione ambientale, gli stili di vita e l'alimentazione che possono giustificare la precocità delle patologie riscontrate in relazione agli studi riportati in letteratura. La ricerca è in una fase di elaborazione, in quanto a questi dati si aggiungeranno quelli relativi ad altri grandi Ospedali romani, così da avere informazioni su tutta l'Area Metropolitana di Roma. Qui viene riportata la metodologia seguita e gli strumenti utilizzati. Peraltro questo materiale è stato oggetto di un seminario, svoltosi il 26 marzo 2015, a cui hanno partecipato anche i responsabili dei principali Dipartimenti di Emergenza romani.

Il presente saggio è diviso in quattro paragrafi che evidenziano il percorso metodologico che è stato utilizzato. Il primo principio seguito è stato quello della ricerca multidisci-

plinare che ha visto impegnato un gruppo di ricerca di medicina d'urgenza con uno delle scienze sociali che ha una specifica esperienza nel campo della mobilità umana. L'operazione ritenuta complessa all'inizio ha poi trovato una sua abitudine nel confronto e nella collaborazione continua per affrontare ciascuna delle scelte necessarie per far progredire la ricerca. La collaborazione multidisciplinare è ormai un processo a cui tutte le ricerche di qualità devono aspirare, per questo viene qui presentata una rapida riflessione su quella che è stata l'evoluzione del concetto di multidisciplinarietà nell'ultimo mezzo secolo. Il campione analizzato è quello di non italiani che richiedono una prestazione urgente in Pronto Soccorso. Ciò rappresenta un'occasione particolarmente significativa per studiare un particolare flusso di persone che transitano nella nostra città. Infatti secondo l'art. 32 della nostra Costituzione «La Repubblica tutela la salute come fondamentale diritto dell'individuo e [...] garantisce cure gratuite agli indigenti» e quindi i PS sono osservatori privilegiati dei bisogni di salute di una popolazione che risiede o transita in una determinata area. Ad essi si rivolgono persone con criticità assistenziale che non trovano accoglienza in altre strutture sia per questioni temporali (il PS è l'unica struttura sanitaria accessibile H24, tutti i giorni e le notti, compresi i festivi) sia per questioni burocratico-amministrative (il PS si prende cura di tutti coloro che vi accedono, anche se non provvisti di alcuna assistenza sanitaria). In particolare agli stranieri extracomunitari senza permesso di soggiorno viene rilasciata una tessera sanitaria STP per accedere gratuitamente presso gli ambulatori STP e, quindi, poter ricevere la prescrizione di farmaci ed accedere alle visite specialistiche.

Per questo motivo si può usare per il flusso di non italiani che transitano per il PS il sintagma "mobilità umana invisibile" in quanto non vi è fonte statistica o analisi qualitativa che può identificare un flusso che casualmente e senza alcun tipo di controllo vi transita. Lo studio della mobilità umana è caratteristico delle scienze sociali e in particolare della Geografia come viene illustrato nel secondo capitolo. Lo studio

dei flussi di popolazione permette di integrare le informazioni cliniche con quelle relative alla consistenza delle singole etnie, alle loro abitudini e alle regioni piuttosto che agli stati di provenienza. In un precedente articolo Montanari (2013) ha considerato nello specifico i ricoveri nei PS prevalentemente da parte di pazienti turisti analizzando alcune città in cui questa rilevazione era stata effettuata e le patologie che erano state riscontrate. Nel terzo capitolo vengono elencate le patologie ricorrenti per ciascuna delle etnie studiate ed infine nel quarto capitolo si fa riferimento alle modalità con cui lo studio potrà essere ampliato a tutti i PS dell'Area Metropolitana di Roma e alle altre grandi città europee. La mobilità umana è infatti un fenomeno globale che può trovare elementi comuni nell'Unione europea grazie ai principi di libertà di movimento ai quali questa si ispira.

L'approccio multidisciplinare: un tema strategico

La ricerca scientifica e tecnologica è importante per lo sviluppo sociale di una comunità mentre gli studi umanistici dominano le scelte di carattere politico. Il ricercatore è stato a lungo in una situazione di disagio quando ha dovuto prendere atto della netta divisione che è esistita, ma ancora esiste, tra le diverse discipline. Non si tratta soltanto di un disagio individuale ma dei complessi problemi politici, ambientali e culturali che la società globale si trova a dove affrontare, e risolvere, come conseguenza di questa divisione. Charles Percy Snow (1959) in un suo famoso lavoro ha da più di mezzo secolo evidenziato il problema dell'incomunicabilità tra scienziati e letterati e quindi della loro incapacità di collaborazione. Secondo Snow (*idem*) sia nell'ambito sociale sia in quello politico sarebbe necessaria la presenza delle due culture che in tal modo potrebbero contribuire a una maggiore profondità di prospettiva. Il lavoro di Snow (*idem*) è stato a lungo oggetto di discussione, di apprezzamenti ed anche di critiche; anche per questo a cinquant'anni dalla sua pubblicazione, le princi-

pali riviste scientifiche hanno dedicato riflessioni e commenti per fare il punto di quella ampia riflessione che vi era stata fino ad allora. Collini (2009) sul «New Scientist» ha rilevato che il maggior merito di Snow era stato quello di criticare la eccessiva specializzazione dei linguaggi; questa contribuiva alla incomunicabilità e andava a limitare la possibilità di divulgazione dei risultati scientifici e non consentiva ai non scienziati di scrivere e riflettere sui temi scientifici. Nell'editoriale di «Nature» (2009) è stato ripreso il concetto della divulgazione ampliandolo al rapporto Nord-Sud, tra Paesi sviluppati e Paesi in via di sviluppo e, infine, tra ricchi e poveri. Nell'editoriale si legge l'auspicio che una terza cultura possa emergere per superare quell'enorme divario esistente tra gli scienziati e gli umanisti. Snow (1963) aveva poi aggiunto alla sua riflessione sulle due culture la speranza della nascita di una terza cultura per mediare la dicotomia assoluta, una cultura molto comunicativa fatta da letterati che avrebbero potuto considerare temi scientifici. John Brockman (1995) ha riunito alcuni dei principali ricercatori del momento per verificare la possibilità di identificare quale poteva essere la terza cultura. Nell'introduzione al suo libro anche Brockman (1995) lamenta che Snow (1963) non ha poi descritto in dettaglio quella terza cultura ed afferma che comunque gli umanisti non comunicano con gli scienziati. Gli scienziati d'altro canto hanno imparato a comunicare direttamente con il grande pubblico. I giornalisti specializzati operano a livello verticale, operano dal basso verso l'alto, mentre i professori comunicano dall'altro verso il basso. In Brockman (1995) la terza cultura non è una disciplina ma un processo che ha come risultato ciò che viene rappresentato dagli scienziati ed dagli altri pensatori che si impegnano nella divulgazione scientifica. Questi attraverso il loro lavoro e le loro capacità divulgative si sostituiscono agli intellettuali tradizionali nel rendere evidente il significato più profondo della nostra vita. Il discorso della divulgazione scientifica è divenuto un elemento cruciale della nostra società. Kagan (2009) rileva che nel corso di cinquanta anni una terza cultura è cresciuta di

importanza, si tratta delle scienze sociali. Il suo lavoro descrive i presupposti, il vocabolario e i contributi delle scienze naturali, delle scienze sociali e delle scienze umanistiche. In particolare le scienze sociali e quelle umanistiche hanno il merito di aver contribuito alla nostra comprensione della natura umana e messo in discussione l'assunto che i processi biologici sono i principali determinanti delle variazioni del comportamento umano. Kagan (*idem*) divide le scienze secondo nuovi parametri che fanno riferimento a variabili molto concrete come l'entità dei finanziamenti necessari, le fonti di finanziamento, le modalità di gestione della ricerca e il modo come i dati vengono cercati e gestiti. Il messaggio di Kagan può essere sintetizzato in due concetti: 1) l'ambiente fisico e culturale conta molto di più della struttura genetica; 2) il corretto studio del comportamento umano si basa sull'analisi della cultura e dei simboli. Le fonti principali per le scienze sociali sono le affermazioni verbali, il comportamento osservato e misurato, e le misurazioni fisiologiche. La "Big Science", che si è sviluppata negli ultimi cinquant'anni, ha tolto l'emozione della scoperta individuale. I finanziamenti di grande entità necessari per la "Big Science" hanno favorito le scienze sociali in cui sono ancora possibili lampi di intuizione e di innovazioni teoriche con finanziamenti di moderata entità. Vengono definite scienze sociali tutte quelle discipline che hanno come oggetto di studio la società e gli esseri umani, intesi nella loro partecipazione alla società. Antropologia, archeologia, criminologia, economia, geografia, storia, relazioni internazionali, materie giuridiche, linguistica, scienze politiche, psicologia sociale, sociologia e lavori sociali sono generalmente considerate scienze sociali a livello delle Nazioni Unite. Certamente non si ravvisa la necessità di catalogare con precisione le discipline ma è necessario prendere atto che alcune discipline si sono trasformate, più di altre, nel tempo e le definizioni, che erano valide negli anni successivi alla fine della Seconda Guerra Mondiale, dovrebbero oggi essere riviste e reinterpretate.

Un caso particolare è rappresentato dai geografi, siano

essi geografi fisici (*natural scientists*) o economici (*social scientists*), che frequentano gli stessi corsi di laurea, condividono le stesse società e organizzazioni professionali, ed infine partecipano a livello internazionale alla stessa International Geographical Union (IGU). La IGU a sua volta aderisce alla International Social Science Council, (ISSC), ma contemporaneamente anche allo International Council for Science (ICSU) al quale partecipano le associazioni di antropologia e di psicologia, ma non le altre scienze sociali. La Geografia quindi rappresenta di per sé già almeno due, ma anche tre, culture e quindi può naturalmente fornire un contributo al superamento delle divisioni interculturali. Questa disciplina che si esprime con la definizione spaziale dei fenomeni e degli eventi, perciò anche con l'aiuto dei più recenti sistemi di informazione geografica, riesce a far comunicare e confrontare eventi e culture eterogenee tramite la loro collocazione sul territorio. La Dichiarazione di Roma (21.11.14) per una Responsible Research and Innovation (RRI) in Europa richiede che tutti i componenti della società, compresa la società civile, siano reciprocamente responsabili dei processi e dei risultati della ricerca. Ciò presuppone la necessità di collaborare nella formazione scientifica, l'identificazione delle priorità, la gestione delle ricerche e della trasmissione delle nuove conoscenze alla società civile. Nell'estate del 2012 la Commissione europea ha pubblicato una serie di misure per rendere più facile l'accesso ai risultati delle ricerche finanziate con fondi pubblici. Una misura ormai nota con il termine "open access"; questa misura dovrà favorire l'accesso ai risultati da parte di altri ricercatori e da parte delle imprese e in questo modo rendere più efficiente l'investimento annuale di € 87 miliardi come ha affermato in quella occasione Máire Geoghegan-Quinn, commissario europeo per la Ricerca e l'Innovazione. La necessità della multidisciplinarietà e della circolazione dei risultati della ricerca scientifica sono ormai parte integrante di tutti i finanziamenti del Programma di ricerche europeo HORIZON 2020 che verranno erogati tra il 2014 e il 2020.

La mobilità umana come elemento di lettura dei cambiamenti sociali

La mobilità umana rappresenta uno dei temi centrali di interesse per le scienze sociali a partire da un paio di decenni (Montanari, Staniscia, 2016). Questa particolare attenzione ha fatto seguito alle trasformazioni nella natura dei flussi migratori e di quelli turistici, in un contesto di avanzata globalizzazione dei cambiamenti che hanno interessato il commercio internazionale, il flusso di capitali e le strategie economiche. Le nuove forme di mobilità umana hanno, a loro volta, influenzato lo sviluppo sociale e culturale e sono state sostenute dai progressi avvenuti nel campo della tecnologia dell'informazione e della comunicazione. Nella cultura contemporanea vi è una forte interrelazione tra i fenomeni a livello globale e lo sviluppo locale. La mobilità umana costituisce una delle più significative modalità in cui questa interrelazione si esprime. Località un tempo collegate dai flussi della forza lavoro stanno divenendo sempre più interrelate da diverse forme di mobilità che trovano una loro validazione nei cambiamenti degli stili di vita, dei modelli di consumo e dagli eventi politici che a questi si accompagnano. Queste nuove forme di mobilità si stanno diffondendo contemporaneamente nel contesto di cambiamenti sostanziali nelle forme più classiche delle migrazioni economiche. La mobilità umana assume forme diverse, che includono le migrazioni e il turismo, e costituisce un elemento di riflessione scientifica per le relazioni e le sovrapposizioni che questi flussi presuppongono. Il turismo è una attività interdipendente con quella di particolari forme di migrazione e costituisce una forma di mobilità, di durata variabile, che a sua volta genera ulteriori forme distinte di migrazioni come quelle che attivate dalla domanda di servizi da parte dei turisti e quelle, di carattere prevalentemente consumistico, che possono assumere forme diverse in funzione della loro durata e motivazioni, come è il caso delle seconde case, delle migrazioni stagionali, delle mi-

grazioni legate ai cambiamenti degli stili di vita e di quelle delle persone anziane e dei pensionati. A partire dal decennio 2000-2010, è stato considerato in Geografia il problema della ri-definizione dei concetti di migrazione e turismo, e della necessità di svolgere nuove ricerche sulla relazione sinergica esistente tra migrazioni e turismo (Hall, Williams, 2002). Molte forme di migrazioni, infatti, generano flussi turistici poiché le comunità di immigrati possono divenire polo di flussi turistici e, contemporaneamente, possono attivare flussi turistici di ritorno, per visitare amici e parenti, e per mantenere relazioni con la terra e la cultura di origine.

Urry (2000) propone un manifesto per la sociologia in cui vengono prese in esame le diverse "mobilità" espresse dagli esseri umani, dalle merci, dalle immagini, dalle informazioni e dai rifiuti, delle loro interdipendenze e delle relative conseguenze sociali. Per questo la seconda parte del titolo del suo volume fa riferimento alle "mobilità" per il ventunesimo secolo: la mobilità deve essere considerata un fenomeno geografico e sociale allo stesso tempo. Quando Urry afferma che la mobilità sociale ha finora fallito nell'ignorare le intersezioni delle classi sociali, i generi e i gruppi etnici con le regioni, le città e i luoghi indica una nuova dimensione della sociologia, non più ancorata al concetto di società umana, ma ormai alla ricerca di nuovi paradigmi quali possono essere appunto le reti, la mobilità e le fluidità orizzontali. Sheller (2011), nel redigere una riflessione storica sul modo in cui la sociologia nella dinamicità culturale espressa negli anni Novanta, ha provocato un'ampia discussione tra i sociologi, ma anche tra gli studiosi di Geografia, antropologia, architettura, pianificazione urbana, teoria dei media e delle comunicazioni, arte. Sulla base di questo nuovo approccio multi-disciplinare i parametri divengono quelli della sociologia dei fluidi, dove non esistono punti, né di partenza né di arrivo, non vi sono specifici panorami di riferimento, le direzioni e la velocità sono più rilevanti degli obiettivi e, quindi, entrano in gioco caratteristiche come la viscosità, la provvisorietà, esistono i muri che ostacolano la mobilità ma non bisogna ignorare il passaggio

per capillarità. Le intersezioni dei fluidi e le scale gerarchiche delle capillarità sono i poli intorno a cui si organizza il potere, così come differenti fluidi si intersecano nei "non luoghi" della modernità. Sui presupposti metodologici di un processo di evoluzione dei flussi di popolazione è stata costituita presso la International Geografical Union (IGU) una Commissione di studio su "Global Change and Human Mobility" (GLOBILITY) a partire dall'anno 2000 (Montanari, 2002). Hanno aderito a GLOBILITY ricercatori e docenti di oltre cento istituti di ricerca, di cui il 50% europei e il resto da tutti gli altri continenti. Le ricerche hanno tratto vantaggio dall'esperienza e dalla evoluzione delle scienze sociali negli ultimi decenni e quindi i contributi non riguardano soltanto i Paesi sviluppati dell'emisfero Nord, ma anche l'Africa e il Pacifico. Per non avere una visione distorta della mobilità umana è stata posta attenzione a che gli autori rappresentassero sia il punto di vista dei Paesi sviluppati che di quelli in via di sviluppo. Sebbene la rete sia stata costituita nell'ambito della IGU sono stati invitati a partecipare attivamente a GLOBILITY anche colleghi di altre discipline delle scienze sociali. Le ricerche hanno preso in esame i processi che sono avvenuti a partire dagli anni Novanta, quando sono stati evidenti anche gli effetti dei cambiamenti globali legati ai processi delle società post-socialiste (Baláz, Williams, 2002; Kolossov, Galkina, 2002; Galkina, 2006) e post-apartheid (Maharaj, 2003; Manik, Maharaj, Sookrajh, 2006).

Nel decennio di attività sono stati esaminati i diversi aspetti della mobilità umana in relazione ai processi di globalizzazione dell'economia e dei consumi (Claval, 2002; Montanari, 2005; Montanari, 2012; Williams, Ford, Mooney, 2012). Il tentativo di porre in un modello riassuntivo la relazione tra le fasi di sviluppo locale e i diversi tipi di mobilità umana è stato realizzato da Montanari (2005). I flussi di mobilità sono stati catalogati secondo tre livelli spaziali: la dimensione locale, quella nazionale ed europea, e quella internazionale extraeuropea; e tre modalità di permanenza: commuting, temporary and permanent mobility (Montanari,

2012). Secondo queste caratteristiche i flussi sono stati distinti in flussi in uscita e flussi in entrata. Più di recente anche il progetto europeo HORIZON 2020 - YMOBILITY ha visto alcuni dei protagonisti del dibattito europeo sulla mobilità umana mettersi insieme per studiare il fenomeno della mobilità giovanile, degli stimoli e delle necessità che la sostengono ed, infine, delle politiche che possono essere messe in atto per esaltare i vantaggi del fenomeno e ridurre gli aspetti negativi nel caso venissero identificati. In tutti questi progetti l'elemento centrale è stato il territorio, esattamente il luogo dove si applicano le teorie spaziali e da dove sono nate le nuove teorie sociali. Certamente il problema non si può limitare alla discussione all'interno delle scienze sociali, ma deve essere applicata come elemento di comprensione per tutti i fenomeni che riguardano gli esseri umani.

I ricoveri al Pronto Soccorso del Policlinico Umberto I di Roma

In questo studio osservazionale retrospettivo si sono estratti dal sistema informatico GIPSE (Gestione Informazione Pronto Soccorso Emergenza) i dati relativi agli accessi effettuati dall'anno 2000 all'anno 2014 presso il Pronto Soccorso del Policlinico Umberto I di Roma. Tra le popolazioni straniere individuate nell'estrapolazione dei dati sono state analizzate le 9 nazionalità numericamente più rappresentate, in ordine decrescente: Romania, Bangladesh, Perù, Cina, Polonia, Albania, Egitto, Filippine, Marocco.

Attraverso il test del X_2 si sono evidenziati i gruppi di diagnosi che, nel confronto tra i gruppi nazionali esaminati, si differenziavano per quanto riguarda le due variabili: età e codice diagnostico ICD-9-CM (International Classification of Diseases - 9th revision - Clinical Modification). Una volta individuati i sottogruppi di diagnosi costituenti almeno il 50% della numerosità campionaria del gruppo si è scelto di analizzare le singole categorie diagnostiche che, per ciascun gruppo nazionale, si differenziassero di un valore percentuale pari

almeno al 10% rispetto al valore percentuale attribuito alla popolazione di controllo costituita dagli altri gruppi nazionali stranieri e dal gruppo di nazionalità italiana. Per ciascun gruppo nazionale si è inoltre esaminata la distribuzione per età all'interno delle singole categorie diagnostiche rappresentanti almeno il 60% della numerosità campionaria all'interno dei sottogruppi di diagnosi. L'andamento nel tempo degli accessi in Pronto Soccorso ha mostrato un costante e progressivo aumento degli accessi di tutti i gruppi nazionali esaminati; una lieve deflessione si osserva solo per la popolazione polacca a partire dagli anni 2005-2006 (Tabella 1).

Tab. 1. *Andamento degli accessi presso il Pronto Soccorso del Policlinico Umberto I negli anni 2000-2014.*

	Romania	Bangladesh	Perù	Cina	Polonia	Albania	Egitto	Filippine	Marocco
2000	324	116	90	46	130	77	77	55	73
2001	1061	428	329	178	431	325	255	197	221
2002	1987	492	411	255	455	392	299	245	262
2003	3476	517	586	326	673	538	372	348	399
2004	4339	680	705	479	698	623	436	388	377
2005	4961	779	798	519	793	589	482	445	401
2006	5515	904	758	619	773	750	517	460	461
2007	5016	899	744	616	640	611	475	493	492
2008	4802	1148	807	747	618	527	567	565	647
2009	5014	1274	894	692	571	570	642	532	528
2010	5303	1479	889	778	542	574	680	665	597
2011	5715	1704	887	787	536	649	777	676	621
2012	5545	2703	838	933	503	617	691	631	597
2013	5596	1969	880	865	547	709	786	658	617
2014	3289	1109	520	506	327	394	572	446	321

L'analisi della distribuzione numerica dei codici diagnostici ha mostrato differenze tra i gruppi nazionali stranieri e quello italiano per quanto riguarda 4 gruppi diagnostici: 1) Le patologie cardiovascolari: più frequenti nella popolazione italiana che presenta un'età media maggiore rispetto ai gruppi stranieri esaminati. 2) Le malattie dell'apparato respiratorio: più frequenti nei gruppi nazionali stranieri, in particolare la categoria diagnostica più rappresentata è quella delle infezioni

acute delle vie respiratorie. 3) Le patologie del genere femminile: in tutte le nazionalità straniere esaminate il numero di accessi per complicazioni di gravidanza, parto e puerperio risulta maggiore rispetto al gruppo italiano. Lievemente maggiore sembra essere la prevalenza di disturbi genitourinari nelle popolazioni peruviana e filippina. 4) La classificazione supplementare dei fattori che influenzano lo stato di salute ed il ricorso al sistema sanitario: i valori percentuali relativi a questi gruppi diagnostici nei pazienti di nazionalità straniera appaiono mediamente più alti rispetto ai cittadini di nazionalità italiana, in particolare tali valori appaiono quadruplicati nei cittadini bengalesi ed egiziani. L'analisi dei differenti motivi di accesso in Pronto Soccorso delle popolazioni straniere esaminate ha rivelato, rispetto alla popolazione italiana, l'esistenza di peculiari patologie per ciascun gruppo nazionale esaminato e caratterizzatesi per maggiori valori percentuali relativi. (tabelle 2, 3, 4, 5, 6, 7, 8, 9, 10).

Dai dati analizzati sono emerse alcune importanti differenze per quanto riguarda alcuni gruppi diagnostici e la loro relazione con determinati gruppi nazionali. Per la popolazione della Romania è emersa una maggiore prevalenza percentuale di insufficienza cardiaca, di malattie del sangue e degli organi ematopoietici, delle patologie neoplastiche (Tabella 2).

Tab. 2. *Romania. Numero di accessi in PS negli anni 2000-2014: 61.943 (61.777 accessi validi).*

GRUPPO 11 COMPLICAZIONI DI GRAVIDANZA	**SOTTOGRUPPO 3** Complicazioni principalmente legate alla gravidanza	**SOTTOGRUPPO 4** Parto normale ed altre indicazioni al ricovero legate alla gravidanza, travaglio e parto	
	Età più precoce.	Età più precoce.	
GRUPPO 7 MALATTIE DEL SISTEMA CIRCOLATORIO	**SOTTOGRUPPO 3** Ipertensione arteriosa	**SOTTOGRUPPO 9** Malattie delle vene e dei vasi linfatici ed altre malattie dell'apparato circolatorio	**SOTTOGRUPPO 6** Altre malattie del cuore
	Età più precoce.	Età più precoce.	Aritmie cardiache - 31.94%; insufficienza cardiaca +17.53%. Età più precoce.

GRUPPO 4 MALATTIE DEL SANGUE E DEGLI ORGANI EMATO-POIETICI	Età più precoce.		
GRUPPO 2 TUMORI	**SOTTOGRUPPO 5 Tumori maligni degli organi genito-urinari**	**SOTTOGRUPPO 7 Tumori maligni del tessuto linfatico ed emopoietico**	**SOTTOGRUPPO 8. Tumori benigni**
	Tumori maligni dell'ovaio e degli annessi uterini -19.7%; tumori maligni della vescica -14.93%; tumori maligni del collo dell'utero + 48.14%. Età più precoce.	Altre neoplasie maligne del tessuto linfatico ed istiocitario -16.79%; leucemia mieloide +13.08 %. Età più precoce.	Leiomioma uterino + 17.7%. Età più precoce.

Tale situazione parrebbe esser dovuta a programmi di screening tumorali (es. HPV test) insufficienti a livello nazionale (Tornesello *et alii*, 2014; Stolnicu *et alii*, 2013; Vallesi *et alii*, 2012; Tornesello *et alii*, 2011; Apostol *et alii*, 2010; Arbyn *et alii* 2009; Arbyn *et alii*, 2007). Per la popolazione del Bangladesh (Tabella 3) si è evidenziata una maggiore prevalenza relativa per le patologie cardiovascolari (in particolar modo la cardiopatia ischemica) e per le complicanze legate alla gravidanza (in particolare l'aumento del peso in gravidanza).

Tab. 3. *Bangladesh. Numero di accessi in PS negli anni 2000-2014: 16.201 (16.148 accessi validi).*

GRUPPO 7 MALATTIE DEL SISTEMA CIRCOLATORIO	**SOTTOGRUPPO 3 Ipertensione arteriosa**	**SOTTOGRUPPO 7 Malattie ischemiche del cuore**	**SOTTOGRUPPO 9 Malattie delle vene e dei vasi linfatici ed altre malattie dell'apparato circolatorio**
	Età più precoce.	Infarto miocardico acuto +11.75 %; altre forme acute e subacute di cardiopatia ischemica +10%; angina pectoris -9.2%; altre forme di cardiopatia ischemica cronica -12.82%. Età più precoce.	Emorroidi +25.77%.

GRUPPO 11 COMPLICAZIONI DI GRAVIDANZA	**SOTTOGRUPPO 3 Complicazioni principalmente legate alla gravidanza**	**SOTTOGRUPPO 4 Parto normale ed altre indicazioni al ricovero legate alla gravidanza, travaglio e parto**	
	Edema ed aumento eccessivo del peso in gravidanza +10.54%; perdita ematica nella fase iniziale della gravidanza -13.32%. Età più precoce.	Età più precoce.	
GRUPPO 18 CLASSIFICAZIONE SUPPLEMENTARE DEI FATTORI CHE INFLUENZANO LO STATO DI SALUTE E IL RICORSO A SERVIZI SANITARI	**SOTTOGRUPPO 4 Persone che ricorrono ai servizi sanitari in circostanze connesse alla riproduzione e allo sviluppo**	**SOTTOGRUPPO 5 Persone che ricorrono al PS per impossibilità ad accede ad altri servizi sanitari**	
	Gravidanza normale +47.01%; misure contraccettive -46.96%. Età più precoce.	Esami medici generali +87.14%; visite ed esami speciali -85.22%. Età più tardiva.	
GRUPPO 5 DISTURBI MENTALI	**SOTTOGRUPPO 3 Disturbi nevrotici e della personalità ed altri disturbi psichici non nevrotici**		
	Sindromi e sintomi speciali +20.39%; disturbi dissociativi e somatoformi -25.57%. Età più precoce.		

È ormai largamente conosciuta l'associazione tra precocità di insorgenza di coronaropatia e popolazione del sud-est asiatico (Deedwania, 2013; Dodani *et alii*, 2012; Jayasinghe, Jayasinge, 2009; Rahaman, Zaman, 2008; McQueen *et alii*, 2008; Yusuf *et alii*, 2004; Nishtar, 2002; Lip *et alii*, 1996). Per la popolazione del Perù (Tabella 4) si sono evidenziati maggiori valori percentuali relativi per quanto riguarda le patolo-

gie dell'apparato cardiocircolatorio: ipertensione arteriosa, malattie a carico del sistema venoso e pericarditi. In letteratura è riportata una maggiore prevalenza di fattori di rischio cardiovascolari nella popolazione sudamericana (López-Jaramillo *et alii*, 2013; Miranda *et alii*, 2013).

Tab. 4. *Perù. Numero di accessi in PS negli anni 2000-2014: 10.136 (10.122 accessi validi). Distribuzione di genere dei pazienti del Perù nel periodo 2000-2014: sesso femminile 64%, sesso maschile 36%.*

GRUPPO 7 MALATTIE DEL SISTEMA CIRCOLATORIO	**SOTTOGRUPPO 3 Ipertensione arteriosa**	**SOTTOGRUPPO 9 Malattie delle vene e dei vasi linfatici ed altre malattie dell'apparato circolatorio**	**SOTTOGRUPPO 6 Altre malattie del cuore**
	Età più precoce.	Emorroidi +11.61%. Età più precoce.	Pericardite acuta + 31.38%; aritmie cardiache -18.25%. Età più precoce.

Per la popolazione della Cina si sono evidenziate maggiori percentuali di diagnosi relative a complicazioni della gravidanza (Tabella 5). La popolazione cinese, pur essendo presente da molto tempo sul territorio italiano, ricorre poco al nostro SSN.

Tab. 5. *Cina. Numero di accessi in PS negli anni 2000-2014: 8.346 (8.333 accessi validi).*

GRUPPO 11 COMPLICAZIONI DI GRAVIDANZA	**SOTTOGRUPPO 3 Complicazioni principalmente legate alla gravidanza**	**SOTTOGRUPPO 4 Parto normale ed altre indicazioni al ricovero legate alla gravidanza, travaglio e parto**
	Età più precoce.	Altre indicazioni per l'assistenza sanitaria o l'intervento relative al travaglio e al parto +14.16%. Età più precoce

Per la popolazione della Polonia si è evidenziata una maggiore prevalenza percentuale delle patologie del sistema gastroenterico (in particolare gastro-duodeniti, epatiti croniche e cirrosi). In Polonia sono documentati elevati tassi endemici di *Helicobacter Pylori* e inefficaci programmi di prevenzione primaria e secondaria per HBV e HCV (Parda, 2014; Stępień, Piwowarow, 2014; Iwanczak *et alii*, 2014; Biernat *et alii*, 2014) (Tabella 6).

Tab. 6. *Polonia. Numero di accessi in PS negli anni 2000-2014: 8.237 (8.203 accessi validi). Distribuzione di genere dei pazienti della Polonia nel periodo 2000-2014: sesso femminile 55%, sesso maschile 45%.*

GRUPPO 9 MALATTIE DELL'APPARATO DIGERENTE	**SOTTOGRUPPO 2 Malattie dell'esofago, stomaco e duodeno**	**SOTTOGRUPPO 5 Enteriti e coliti non infettive**	**SOTTOGRUPPO 6 Altre malattie dell'intestino e del peritoneo**	**SOTTOGRUPPO 7 Altre malattie dell'apparato digerente**
	Gastrite e duodenite +23.61%; malattie dell'esofago -17.28%; disturbi della funzione gastrica -11.72%. Età adulta (20-46 anni).	La distribuzione per età dei gruppi campionari più rappresentati (≥ 60%) mostra un picco infantile sovrapponibile a quello della popolazione di nazionalità non polacca e poi una prevalenza in età adulta.	Ragade e fistola anale -11.48%. La distribuzione per età dei gruppi campionari più rappresentati (≥ 60%) risulta rappresentata principalmente in età infantile ed adulta (24-53 anni).	Malattia epatica cronica e cirrosi +14.52%. Età più precoce.
GRUPPO 12 MALATTIE DELLA CUTE E DELL'APPARATO SOTTOCUTANEO	**SOTTOGRUPPO 2 Altre manifestazioni infiammatorie della cute e del tessuto sottocutaneo**			
	Orticaria -32.46%. Età più precoce.			
GRUPPO 16 SINTOMI, SEGNI E STATI MAL DEFINITI	**SOTTOGRUPPO 1 Sintomi**			
	La distribuzione per età dei gruppi campionari più rappresentati (≥ 60%) mostra una prevalenza in età adulta e minore rappresentazione della popolazione infantile rispetto alla popolazione di nazionalità non polacca.			

Per la popolazione albanese si sono evidenziati aumentati tassi relativi di disturbi episodici dell'umore e di malattie dell'apparato cutaneo (Tabella 7). La maggiore incidenza di patologie dermatologiche da contatto potrebbe essere messa in relazione ad esposizione a gas tossici in ambito lavorativo.

Tab. 7. *Albania. Numero di accessi in PS negli anni 2000-2014: 7.945 (7.930 accessi validi).*

GRUPPO 5 DISTURBI MENTALI	**SOTTOGRUPPO 2 Altre psicosi**	**SOTTOGRUPPO 3 Disturbi nevrotici e della personalità ed altri disturbi psichici non nevrotici**
	Disturbi episodici dell'umore +23.46%. Età più precoce (17-37 anni).	Età più precoce.
GRUPPO 12 MALATTIE DELLA CUTE E DELL'APPARATO SOTTOCUTANEO	**SOTTOGRUPPO 1 Infezioni della cute e del sottocutaneo**	**SOTTOGRUPPO 2 Altre manifestazioni infiammatorie della cute e del tessuto sottocutaneo**
	Foruncolo e favo +17.43%; cisti pilonidale +15.12%; impetigine -29.54%. La distribuzione per età dei gruppi campionari più rappresentati (≥ 60%) risulta interessa una fascia d'età che va dai 23 ai 40 anni.	Orticaria -22.65%. Età più precoce.
GRUPPO 18 CLASSIFICAZIONE SUPPLEMENTARE DEI FATTORI CHE INFLUENZANO LO STATO DI SALUTE E IL RICORSO A SERVIZI SANITARI	**SOTTOGRUPPO 4 Persone che ricorrono ai servizi sanitari in circostanze connesse alla riproduzione e allo sviluppo**	**SOTTOGRUPPO 9 Persone contattate durante visite ed esami individuali e collettivi senza indicazione della diagnosi**
	Età più precoce.	Esami medici generali +12.83%; visite ed esami speciali -12.46%. Età più precoce (picco di prevalenza tra i 18 e i 30 anni).
GRUPPO 11 COMPLICAZIONI DI GRAVIDANZA	**SOTTOGRUPPO 3 Complicazioni principalmente legate alla gravidanza**	**SOTTOGRUPPO 4 Parto normale ed altre indicazioni al ricovero legate alla gravidanza, travaglio e parto**
	Età più precoce.	Età più precoce.

Per la popolazione filippina si sono evidenziati aumentati valori percentuali di patologie del sistema genitourinario femminile. La popolazione filippina pare ricorrere poco al nostro SSN (Tabella 8).

Tab. 8. *Filippine. Numero di accessi in PS negli anni 2000-2014: 6.804 (6.782 accessi validi). Distribuzione di genere dei pazienti nel periodo 2000-2014: sesso femminile 64%, sesso maschile 36%.*

GRUPPO 10 MALATTIE DEL SISTEMA GENITOURINARIO FEMMINILE	**SOTTOGRUPPO 2** **Altre patologie del sistema urinario**	**SOTTOGRUPPO 6** **Altre malattie dell'apparato genitale femminile**
	Cistite +19.34%; altre patologie dell'uretra e del sistema urinario visite -13.67%. La distribuzione per età dei gruppi campionari più rappresentati (≥ 60%) interessa una fascia d'età che va dai 18 ai 55 anni e mostra l'assenza del picco infantile.	Disordini mestruali ed altri sanguinamenti anomali del tratto genitale femminile +25.29%; dolori e altri sintomi associati agli organi genitali femminili -14.1%. La distribuzione per età dei gruppi campionari più rappresentati (≥ 60%) risulta sovrapponibile.

Per la popolazione marocchina si è evidenziato un maggior numero relativo di patologie cardiovascolari (insufficienza cardiaca, altre cardiopatie) e di patologie cerebrovascolari (in particolare emorragie cerebrali e intracraniche) (Tabella 9). In letteratura si parla di incidenza ormai aumentate di patologie vascolari nella popolazione nordafricana (Khamlichi *et alii*, 2001; Schneck *et alii*, 2005) (Tabella 10).

Tab. 9. *Marocco. Numero di accessi in PS negli anni 2000-2014: 6.614 (6.596 accessi validi).*

GRUPPO 7 MALATTIE DEL SISTEMA CIRCOLATORIO	**SOTTOGRUPPO 6 Altre malattie del cuore**	**SOTTOGRUPPO 7 Malattie cerebrovascolari**	**SOTTOGRUPPO 9 Malattie delle vene e dei vasi linfatici ed altre malattie dell'apparato circolatorio**
	Insufficienza cardiaca +12.08%; forme e condizioni mal definite di cardiopatia +14.99%; di aritmie cardiache -44.23%. Età più precoce.	Emorragia cerebrale +20.60%; postumi delle malattie cerebrovascolari +14.51%; altre e non specificate emorragie intracraniche +10%; ischemia cerebrale transitoria -26-49%. Età più precoce.	Età più precoce.

Tab. 10. *Egitto. Numero di accessi in PS negli anni 2000-2014: 7.628 (7.614 accessi validi).*

GRUPPO 18 CLASSIFICAZIONE SUPPLEMENTARE DEI FATTORI CHE INFLUENZANO LO STATO DI SALUTE E IL RICORSO A SERVIZI SANITARI	**SOTTOGRUPPO 9 Persone contattate durante visite ed esami individuali e collettivi senza indicazione della diagnosi**	
	Esami medici generali +90.61%, +N. 336; visite ed esami speciali -88.44%. La distribuzione per età dei gruppi campionari più rappresentati (≥ 60%) risulta poco più tardiva.	
GRUPPO 11 COMPLICAZIONI DI GRAVIDANZA	**SOTTOGRUPPO 3 Complicazioni principalmente legate alla gravidanza**	**SOTTOGRUPPO 4 Parto normale ed altre indicazioni al ricovero legate alla gravidanza, travaglio e parto**
	Età più precoce.	Età più precoce.

L'uso dei BIG DATA e le prospettive di ricerca

Alla luce delle recenti analisi sulle potenzialità offerte dalla banca dati del Pronto Soccorso del Policlinico Umberto I di Roma, è possibile inquadrare il contesto concettuale, estendibile ad una rete inter-ospedaliera sia a carattere urbano che nazionale o europeo, relativo alla raccolta, alla manipolazione e all'estrazione di informazioni di tali dati nell'ambito della gestione dei "Big Data" (Snijders *et alii*, 2012). Il concetto di "Big Data", di recente e ormai accreditata definizione, riguarda la trattazione di insiemi di dati talmente grandi e complessi che le normali applicazioni di elaborazione dei dati tradizionali si rivelano spesso inadeguate per motivi di efficienza e affidabilità. In generale, le caratteristiche della manipolazione di "Big Data" includono l'analisi, l'acquisizione, la pulizia, l'innovazione, la condivisione, la memorizzazione, il trasferimento, la visualizzazione e la privacy dei dati considerati. L'imporsi di banche di informazioni a carattere internazionale determinate dai moderni *Social Networks* (*Facebook*, *Twitter*), motori di ricerca (*Google*), servizi di comunicazione internet (*Skype*, *Whatsapp*), portali di attività commerciali (Amazon) e di fruizione e condivisione di materiale multimediale (*Spotify*, *YouTube*, *Vimeo*), ha radicalmente modificato i classici approcci all'analisi e al trattamento dei dati personali, richiedendo opportune innovazioni negli approcci algoritmici e tecnologici volti alla predizione, all'estrazione di informazioni strutturali e alla gestione tecnologica di enormi quantità di dati da memorizzare. Questi dati, oltre a rappresentare numerose informazioni sui singoli utenti di interesse specifico per il servizio considerato, contengono implicitamente un sottoinsieme informazionale connesso ad indicazioni di carattere territoriale, sociale, demografico e culturale di difficilissimo se non impossibile reperimento dai canali ufficiali e istituzionali degli enti specificatamente addetti (Istat, Eurostat, banche dati di comuni o regioni) (Kunčič, 2014) che dispongono di strumenti per il recupero di informazioni notevolmente meno efficienti e dettagliati di quelli disponibili sul

web. Questo divario risulta ancor più ampio se si tiene conto della disponibilità temporale di tali dati, della possibilità di tracciarne le modificazioni dinamiche e di considerarli, pertanto, alla stregua di un incessante *streaming* informazionale continuamente disponibile e spontaneamente prodotto (Wähner, 2014).

Per molti aspetti, le informazioni di un centro di Pronto Soccorso sono del tutto analoghe a quanto sopra decritto, sebbene con ovvie differenze di volume e di campionamento. Il Pronto Soccorso del Policlinico Umberto I di Roma ha memorizzato circa un milione e ottocentomila dati di accesso in 15 anni (dal 2000 al 2014), per una media di centoventimila informazioni socio-sanitarie l'anno, ossia più di trecento al giorno. Il contenuto di questi dati consiste sia in informazioni di carattere medico (diagnosi all'arrivo, codice di accesso, esito all'uscita dal Pronto Soccorso), sia e soprattutto di carattere socio-demografico (data e luogo di nascita, residenza, professione, cittadinanza). Tenendo conto che una quantità non trascurabile dei pazienti (circa il 20%) ha cittadinanza non italiana e che il Pronto Soccorso ha l'obbligo di assistere qualsiasi paziente, anche se non in possesso di documenti di identità o di regolare permesso di soggiorno, risulta palese l'effettiva potenzialità rivolta all'integrazione di informazioni relative agli aspetti demografici e sociali, oltre a quelli socio-sanitari, di persone difficilmente inquadrabili mediante censimenti o iscrizioni in registri ufficiali. Dalle analisi preliminari effettuate sui dati suddetti è stato possibile, ad esempio, mettere in chiara evidenza le differenze significative nell'insorgenza di patologie croniche da parte di pazienti di diverse nazionalità, permettendo di conseguenza riflessioni sulla prevenzione da adottare in occasione di migrazioni verso il nostro Paese, nonché di aggiornamento rispetto ai dati ufficiali di cittadini non italiani presenti sul territorio del Comune di Roma (www.comune.roma.it).

L'idea di sviluppare un sistema integrato in grado di raccogliere dinamicamente questo tipo di informazioni provenienti dai centri di Pronto Soccorso al solo territorio urbano

del Comune di Roma permetterebbe di estendere questo genere di risultati ad un campione socio-sanitario di circa cinque volte maggiore (www.regione.lazio.it), producendo un osservatorio permanente che si avvarrebbe di tecniche algoritmiche di analisi dei dati in grado di processare le informazioni in tempo reale e di aggiornare i risultati a qualsiasi livello di dettaglio, nel rispetto delle condizioni di privacy dei pazienti. Il naturale sviluppo di un siffatto sistema riguarda l'estensione su base nazionale ed europea all'interno del quale ogni città o paese aderente al progetto avrebbe la possibilità di integrare con i propri dati le informazioni provenienti dai principali centri di Pronto Soccorso, con il vantaggio di ottenere non solamente un'analisi standardizzata della situazione socio-sanitaria locale e compatibile sull'intero territorio continentale, ma anche un confronto costante con gli altri paesi o regioni partecipanti.

Le analisi dei dati da impiegare in un tale contesto si possono suddividere in tecniche di statistica descrittive e inferenziale da un lato, e approcci di analisi di natura non lineare e di predizione dinamica di sistemi complessi. Nella prima categoria sono senz'altro da considerarsi le tecniche di analisi multivariata, di test di ipotesi e di analisi di cluster. L'analisi multivariata (Johnson *et alii*, 2007) è uno specifico campo della statistica che comprende l'osservazione e l'analisi simultanea di più di una variabile, strumento molto utile per definire relazioni di dipendenza tra gruppi di variabili di ingresso o indipendenti, e di uscita o dipendenti, nonché la rilevanza di tali relazioni per il problema sotto analisi. Questo genere di approccio, sebbene limitato da ipotesi forti in genere legate alla Gaussianità o alla natura lineare del sistema sotto esame, ha il vantaggio di essere fondato sulle distribuzioni statistiche delle variabili e dei loro sottogruppi che, in un contesto di accumulazione derivante da sorgenti molto grandi, permette un rapido aggiornamento dei risultati a fronte di un esiguo processo computazionale. Inoltre, tecniche multivariate come la PCA, Analisi delle Componenti Principali, assieme con l'Analisi dei Fattori e Analisi delle Corrispondenze (Jolliffe,

1986) consentono spesso una significativa riduzione della dimensionalità dei dati, favorendo così sia la definizione di semplici relazioni descrittive tra le variabili, sia l'esclusione di fattori, o combinazioni di essi, poco significativi nella descrizione del processo.

I test statistici di ipotesi (Hazenwinkel, 2001) rappresentano uno strumento molto importante nell'analisi statistica in quanto sono devoluti all'accettazione o alla remissione di un'ipotesi fatta a priori sulla natura dei dati sotto esame. Nell'analisi preliminare svolta sui dati di Pronto Soccorso, ad esempio, è stato impiegato un test detto del "Chi Quadro" per testare la somiglianza tra distribuzioni di diversi dati socio-sanitari comparando la frequenza delle età di pazienti per date categorie di patologie, riuscendo così a mettere in evidenza le anomalie tra gruppi di controllo definiti dalla distruzione dei soggetti italiani con gruppi di altra nazionalità con sufficiente numerosità. Uno dei test statistici più utili e potenti da menzionare è il l'Analisi della Varianza (ANOVA) e la sua estensione al caso multivariato (MANOVA) (Cox, 2006). Mediante questa tecnica è possibile evidenziare il discostamento di dati provenienti da gruppi multipli rispetto al caso generale.

Infine, le tecniche di *clustering* e *cluster analysis* (Bailey, 1994) si basano su misure relative alla somiglianza tra sottoinsiemi di dati in grado di definire in modo relativamente automatico la presenza di categorie informazionali e di insiemi disgiunti. In molti approcci questa similarità, o meglio, dissimilarità, è concepita in termini di distanza in uno spazio multidimensionale. La bontà delle analisi ottenute dagli algoritmi di *clustering* dipende molto dalla scelta della metrica e, quindi, da come è calcolata la distanza. Gli algoritmi di *clustering* raggruppano gli elementi sulla base della loro distanza reciproca e perciò l'appartenenza o meno ad un insieme dipende da quanto l'elemento preso in esame è distante dall'insieme stesso. Un limite degli approcci tradizionali ai *cluster* nella statistica descrittiva è nell'influenza che le ipotesi iniziali producono sul risultato finale. Come si vedrà,

nell'ambito delle tecniche algoritmiche non lineari tale influenza sarà fortemente ridotta a tutto beneficio della generalizzabilità dei risultati.

Il campo delle analisi mediante algoritmi non lineari è molto vasto e in continua evoluzione. Esso viene spesso ispirato da considerazioni relative a modelli matematici di sistemi complessi naturali, come quelli biologici, e da formulazioni proprie dell'Intelligenza Artificiale. Esponente di grande successo di tale ambito è il campo delle Reti Neurali Artificiali (ANN) (Rojas, 1996). Questa categoria di sistemi computazionali si inquadra in un approccio riduzionistico della modellizzazione dei sistemi cognitivi naturali ed è essenzialmente costituito dall'impiego di unità semplici, dette neuroni, in grado di operare semplicissime valutazioni non lineari circa gli stimoli d'ingresso e collegate tra loro secondo architetture specifiche attraverso quantità modulatrici dette pesi sinaptici. La potenza computazionale e analitica di questa classe di sistemi è ormai ben definita e accettata a seguito di una grande quantità di ricerca e di articoli pubblicati in questi ultimi trent'anni. Una caratteristica di notevole interesse per l'approccio neurale consiste nell'esigua quantità di ipotesi da dover formulare prima della loro applicazione. Un sistema neurale, infatti, una volta definito sul piano della sua architettura è in grado di modificare i suoi parametri interni mediante un processo detto di apprendimento. Mediante questa operazione vengono presentati i dati la cui natura o struttura deve essere identificata e, grazie ad un processo di adattamento dinamico, la rete neurale sarà in grado di modellizzare non solo i dati stessi, ma anche la legge generale che ne regola il comportamento (generalizzazione). Anche nell'ambito delle Reti Neurali Artificiali è possibile distinguere tra approcci uninvariati e multivariati. Esempio classico di quest'ultima categoria è la rete neurale di tipo *feed-forward* (o a propagazione in avanti) chiamata *Perceptron* il cui algoritmo di apprendimento principale, detto *Back-Propagation*, è basato sulla regola di Widrow-Hoff o discesa sul gradiente (Rumelhart *et alii*, 1986).

Una tipologia di rete neurale molto interessante e consi-

derata la controparte non lineare degli approcci di statistica multivariata lineare come la PCA o di *clustering*, è rappresentata dalle Mappe Auto-Organizzate (Self-Organizing Map – SOM) nella loro configurazione più nota data dalla rete di Kohonen (1982). Questo tipo di rete neurale è in grado di estrarre automaticamente le caratteristiche di clusterizzazione dei dati in ingresso, definendo allo stesso tempo delle varietà geometriche corrispondenti, nell'estensione non lineare, agli assi lineari dati dagli autovettori della PCA. Questo approccio permette di ottenere delle descrizioni dei dati su varietà di dimensionalità inferiore allo spazio di partenza mediante un processo computazionale fondato solamente sulla natura topologica dei dati e non su ipotesi di qualche natura.

Uno degli aspetti più utili nell'analisi di dati spazio-temporali è la possibilità offerta dalle moderne tecniche matematiche e algoritmiche di poter prevedere l'evoluzione futura del sistema informazionale, sorgente dei dati sotto analisi. Questo aspetto riguarda specificatamente l'ambito di identificazione e modellizzazione di sistemi dinamici in genere non-lineari a partire dalle caratteristiche topologiche dello spazio dei campioni che descrivono il sistema stesso. Anche in questo caso, alcuni tipi di Reti Neurali Artificiali sono strumenti particolarmente potenti per tale scopo, grazie alla loro specifica forma architetturale in grado di cogliere gli aspetti dinamici del sistema originale in virtù di una implicita natura iterativa interna (www.brains-minds-media.org).

Conclusioni

I dati hanno evidenziato peculiari associazioni tra determinati gruppi diagnostici e determinati gruppi nazionali: popolazione rumena e malattie neoplastiche; popolazione bengalese e coronaropatie in età precoce; popolazione peruviana e malattie del sistema circolatorio; popolazione polacca e malattie gastro-intestinali; popolazione albanese e disturbi mentali e dermatologici; popolazione filippina e malattie ge-

nito-urinarie femminili; popolazione marocchina e patologie vascolari. Questi dati appaiono particolarmente importanti perché conoscere una patologia significa saperla riconoscere precocemente, capacità particolarmente utile quando l'anamnesi con il paziente risulti schermata da barriere linguistico-culturali. Sarebbe auspicabile poter inserire questi pazienti in percorsi di prevenzione e cura ambulatoriali dopo l'inquadramento e le prime cure prestate in Pronto Soccorso.

Un dato emerso per tutte le etnie esaminate è la presenza sul territorio di una popolazione femminile straniera e giovane che affronta la gravidanza in età inferiore rispetto alla popolazione italiana; in tale percorso richiede un'assistenza di tipo prevalentemente ospedaliera per motivi medico-legali ed economici. Sarebbe auspicabile creare percorsi dedicati alle donne straniere di educazione sessuale ed assistenza ginecologica al di là dell'immediata cura fornita in Pronto Soccorso.

Un'ultima considerazione riguarda gli accessi impropri in Pronto Soccorso da parte dei cittadini stranieri. Tale fenomeno è spesso legato a problematiche di tipo medico-legale che rendono inaccessibili l'assistenza della medicina generale ma anche l'assistenza ambulatoriale da parte del cittadino straniero. Sarebbe utile creare già nei locali dei Dipartimenti di Emergenza un punto di informazione sulle normative che regolamentano l'accesso alle cure del cittadino straniero. I risultati dello studio di fattibilità riportano comunque informazioni scarsamente conosciute che riguardano i bisogni assistenziali di popolazioni che sono migrate a Roma da paesi, anche lontani, provenienti da quattro continenti. La durata dell'osservazione e la dimensione del campione sono variabili che rendono affidabili i dati che sono finora emersi. In alcuni casi le patologie assumono un interesse particolare non tanto per la numerosità dei campioni quanto per l'età di insorgenza, peculiarità che ha suscitato l'interesse della letteratura internazionale. La casistica appare, comunque, esigua, pur raccolta in un arco temporale lungo, e la provenienza del campione da un unico punto di osservazione, anche se di un grosso Ospedale, renderebbe auspicabile il coinvolgimento in

questa ricerca di altri PS romani per avere un'idea più precisa della realtà metropolitana e, in seconda battuta, di altre aree metropolitane europee per analizzare il reale impatto nel tempo della cardiopatia ischemica in soggetti così giovani e quanto, eventualmente, l'ambiente e gli stili di vita possono modificare ciò che è patrimonio del codice genetico. I risultati potrebbero avere ricadute sulla organizzazione dei sistemi sanitari al duplice scopo di richiamare l'attenzione degli operatori sanitari sulla precocità degli eventi cardiovascolari maggiori in popolazioni del Sud-est asiatico e di inserire questa giovane popolazione a rischio in un sistema ambulatoriale di prevenzione primaria e secondaria. L'analisi, inoltre, se replicata in altre aree urbane/metropolitane, può fornire la base per confronti tra Paesi dell'Unione europea e mettere in rilievo convergenze o divergenze nel territorio dell'Unione. I risultati potranno essere utilizzati per orientare le politiche della salute nei Paesi dell'Unione europea e per supportare le politiche sanitarie nei Paesi di origine dei cittadini stranieri che, spesso, provengono da Paesi emergenti o in ritardo di sviluppo.

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Human Mobility and Accident and Emergency (A&E) Department: A contribution to the knowledge of invisible flows

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Human Mobility and Accident and Emergency (A&E) Department: A contribution to the knowledge of invisible flows

Mobilité humaine et services des urgences: une contribution à la connaissance des flux invisibles

BEATRICE BERTAZZONI, GIULIANO BERTAZZONI ET ARMANDO MONTANARI

Résumés

English Français
This article provides a full report of the results of a feasibility study for a project based on the combination of clinical figures with socio-economic data on human mobility within the metropolitan area of Rome. Acknowledging that Accident and Emergency (A&E) Departments represent privileged observatories of health issues of a given territory, the point of departure of this study is the patient register dataset of the A&E Department of the Policlinico Umberto I for the period 2000-2013. The data analysis reveals the existence of a specific relationship between diagnostic groups and certain ethnicities immigrated to Rome. Through a multidisciplinary approach, the analysis undertaken aims to improve the medical practice of the personnel working in facilities for immigrants. The knowledge acquired from the study can be in fact useful to quickly detect specific clinical patterns, overcoming any cultural barrier or linguistic obstacle. Moreover, the analysis can provide suggestions to improve health policies, creating, together with the relevant healthcare facilities, pathways for prevention and care of certain diseases.

Cet article présente les résultats d'une étude de faisabilité dans le cadre d'un projet basé sur le croisement des données cliniques avec les données socio-économiques relatives aux mobilités humaines dans l'aire métropolitaine de Rome. Partant du constat que les services des urgences représentent des observatoires privilégiés des problèmes de santé sur un

territoire déterminé, cette étude s'appuie sur la base de données des enregistrements des patients au Service des urgences de la Policlinique Umberto I sur la période 2000-2013. L'analyse des données révèle l'existence d'une relation spécifique entre une série de groupes de diagnostics et certaines origines ethniques. Au travers d'une approche multidisciplinaire, l'analyse vise à améliorer les pratiques médicales du personnel travaillant dans les infrastructures pour personnes immigrées. La connaissance acquise grâce à l'étude permet de détecter rapidement des schémas cliniques spécifiques, au-delà de toute barrière culturelle ou obstacle linguistique. En outre, l'étude peut fournir des suggestions visant à améliorer les politiques sanitaires en développant, avec les établissements hospitaliers compétents, des pistes de prévention et de soins dans certaines pathologies.

Entrées d'index

Mots-clés : mobilité humaine, flux invisibles, immigration, service des urgences, admissions, Policlinique Umberto I, Rome
Keywords : human mobility, invisible mobility, immigration, accident and emergency department, admissions to accident and emergency departments, Policlinico Umberto I, Rome

Texte intégral

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Introduction

1 Since the 1980s, Italy has been registering a substantial increase in migration levels due largely to the fact that the political, economic and social conditions of countries of those immigrating do not allow their survival. Immigrants constitute part of the foreign population residing in Italy which, according to the "statistical dossier on Immigration" (Report UNAR 2014), is estimated to be composed of over 5 million of people. The vast majority of these immigrants live in the largest metropolitan areas such as Rome, Milan and Turin, and nearly 700,000 are concentrated in the Lazio region. Only half of the total amount of the immigrant population is in employment and less than one-tenth holds a valid residence permit for either work, family reunion, political asylum, or study reasons. The majority of immigrants come from countries with traditionally high rates of emigration. Even though percentages may vary from region to region, and some communities may be concentrated in certain places more than others, the most numerous non-national populations residing in Italy originate from Romania, Albania, Morocco, China, Ukraine, the Philippines, India, Peru, Bengal, Poland and Tunisia.

2 This article provides a full report of the results of a study for a project based on the combination of clinical figures with socio-economic data on human mobility within the metropolitan area of Rome. The point of departure of this analysis is the patient register dataset of the Accident and Emergency Department of the Policlinico Umberto I for the period 2000-2013.

3 The hospital registers the greatest number of admissions (approximately 140,000 in 2014) within the Lazio region. It is not only located next to two of the railway stations (Termini and Tiburtina) where many illegal immigrants transit or find shelter, but it is also very close to the Esquilino District, where many (regular and illegal) immigrants work and find home.

4 The clinical observation of the data reveals high occurrences of particular

diseases in individuals of specific ethnic origin who have immigrated to Rome. Hence the necessity to gather more information on size and characteristics of migration flows, using a multidisciplinary approach.

5 From many years now, Italy has been a destination country for immigrants. It urges the creation of social policies that will enable the integration of different ethnicities, and the implementation of health monitoring tools together with public health intervention programmes. These programmes should be targeted to address specific health needs that have to be identified. To these ends, the Accident and Emergency unit represents a valid mean of support.

6 The term invisible flow was first used to describe the flow of returnees at the end of colonialism. These return flows concerned individuals coming back to countries of ancient European origins, and were differentiated from the traditional concept of immigration flows (Smith, 2003), as in this case were involved white individuals culturally compatible with the countries of migration. This interpretation of the term was also used for similar phenomena that had taken place during the Second World War (Isaac, 1954). Findlay (1995) addresses the phenomenon of invisible flows referring it to the mobility of skilled personnel migrating for short periods of time, without posing any problem in terms of ethnicity. The author therefore links the concept to the process of internationalization of the production sector, which occurred in the previous two decades. Croucher (2009) instead uses the term invisible flows in the context of new forms of globalization associated with economy and the labour market. More specifically, the scholar focuses on cross-border migration flows (with particular attention to the US-Mexico border), which follow new types of patterns and have specific characteristics.

7 From a healthcare perspective, the phenomenon of invisible flows, consisting of both informal and illegal immigrants, requires constant use of resources to monitor the health of migrants.

8 Even though, an initial assessment of the health condition of immigrants can be taken in reception centres, it is often difficult to adequately assess their long-term health needs due to the fact that some immigrants either move to other states, or whilst remaining in the receiving country- Italy in this case- very often they do not hold a registered employment contract, or a lease contract, or are not registered on the National Health Service. Practically they are an “invisible human mobility” since complete data of their existence in a specific time and place is not fully documented. The only evidence of their presence in a particular territory is often only found within emergency systems if they happened to have checked in due to a health emergency.

9 A survey conducted by the ISTAT in 2011/12 assessed through interviews the number of immigrants who had visited an emergency Accident and Emergency Department in the previous three months. There were found to be 66 immigrants out of 1,000 versus 50.5 per 1.000 of Italians.

10 The number of visits to the Accident and Emergency Department is higher for foreigners in the age group 25-34 (77.5 per 1,000), while in the case of Italians it increases after 55 years of age. Indeed Accident and Emergency Departments represent privileged observatories of health issues of a given territory. They cope with the weaknesses of the health system that, in absence of services of prevention and care, imposes the use of health care facilities only in case of emergency.

11 On the basis of this observation, a retrospective observational analysis has been conducted on the data provided by the Accident and Emergency Department of the Policlinico Umberto I of Rome. It is composed of a study on admissions of foreign citizens in the 2000s in the metropolitan area of Rome. The idea is to understand peculiarities and differences between the state of health of the Italians

and the immigrant populations. Furthermore, the intention is to assess the variation of health needs over time, as a result of changes in the environmental, socio-economic, and political conditions.

12 The study undertaken aims to improve the medical practice of the personnel working in facilities for immigrants. The knowledge acquired from the study can be in fact useful to quickly detect specific clinical patterns, overcoming any cultural barrier or linguistic obstacle. Moreover, the analysis can provide suggestions to improve health policies, creating, together with the relevant healthcare facilities, pathways for prevention and care of certain diseases beyond the urgency of a critical circumstance that leads the foreign citizen to visit the Department of Emergency Acceptance. Furthermore, replicating this analysis in other urban/metropolitan areas can highlight differences and similarities within the territories of the European Union and represent the basis for a comparison between the EU countries. The results of this study could be used to guide health policies of the EU territories, and to support heath policies of the nations of origin of foreign citizens who often come from emerging or less developed countries.

13 The data used in this retrospective observational study (all entries to the Accident and Emergency Department of the Policlinico Umberto I of Rome from 2000 to 2013), were extracted from the IT system GIPSE (Information Management ER and DEA). Among the foreign populations identified through the data, it has been conducted an in depth analysis of the nine numerically more representative nationalities. In descending order they are Romanian, Bengali, Peruvian, Chinese, Polish, Albanian, Egyptian, Filipino, and Moroccan citizens.

14 From the statistical analysis of the data collected, emerged groups of diagnosis that differed from the other national groups examined, with respect to two variables: age and diagnostic code ICD-9-CM (International Classification of Diseases – 9th revision – Clinical Modification). There were first identified subgroups of diagnosis constituting at least 50% of the sample size. It was then chosen to analyse each diagnostic group that, for each national group, differed by at least 10% from the percentage value of the control population composed of all the other national groups, Italians included. For each national group also examined was the age distribution in every single diagnostic group that accounted for at least 60% of the sample size of the diagnosis subgroups.

Methods

A multidisciplinary approach: advantages and disadvantages

15 The origin of the problem of using of a multidisciplinary approach to identify and address the phenomenon of invisible flows appears to be quite recent. Given the size of the phenomenon, this approach is the only one that can deal with some of the issues that single disciplines cannot solve, as it goes beyond their individual reach. Surveys conducted during International Geography congresses held in 2015 (Eugeo, Budapest, IGU, Moscow) confirmed the interest of many scholars - that have not completed or published their studies yet -in the use of such a multidisciplinary approach. At a methodological level, this study tackles the problem at its roots reviewing literature that has addressed the issue of collaboration between social and medical sciences.

16 Scientific and technological research is important for the social development of

a community; humanistic studies greatly influence the political sphere of a particular territory. The acknowledgement of the existence of a sharp division between the different disciplines created several complications for researchers. The consequence of this division is not only individual in nature, but also creates complex political, environmental, and cultural problems that global society has to face and solve. More than half a century ago, Charles Percy Snow (1959) highlighted the problem of incommunicability between scientists and scholars, shedding a light on their inability to collaborate. According to Snow (1959), to gain a more profound perspective in both the social and the political fields it would be necessary to create a comprehensive approach of the two cultures.

17 The work of the author has long been subject of discussion, appreciation and also criticism. For this and other reasons, fifty years later, important scientific journals still appraise and discuss his conclusions. Snow (1963) also contemplates the possibility of the emergence of a third culture able to mediate this absolute dichotomy. In fact, the author conceived the idea of a very communicative culture of humanists capable of considering scientific issues.

18 After all, scientists learned how to communicate directly with the general public. Specialised journalists operate at a vertical level, from bottom to top, while professors communicate from top to bottom. In Brockman (1995) the third culture is not a discipline but a process resulting in all pieces released by scientists and other thinkers who engage in scientific divulgation. Through their work and their outreach abilities, these scholars replace traditional intellectuals in making clearer the deeper meaning of our lives. The subject of scientific divulgation has become a crucial element of our society.

19 Referring to social sciences Kagan (2009) notes that a third culture has grown in importance over the past fifty years. In his work, the author describes prerequisites, vocabulary, and contributions of the natural, social, and humanistic sciences. In particular social and humanistic sciences have the merit of having contributed to our understanding of human nature, and questioned the assumption that biological processes are the main determiners of changes in human behaviour. Kagan (2009) divides sciences on the basis of new parameters that refer to very specific variables such as fund size, funding sources, methods of research management, and ways to gather and use data. The author's message can be summarized in two main ideas: the physical and cultural environment matter much more than the genetic structure, and the proper study of human behaviour is based on the analysis of culture and symbols.

20 For the social sciences, the main sources of information are verbal statements, the observation and measurement of human behaviour, and physiological measurements. The "big science" that has developed in the past fifty years has taken away the excitement of the personal discovery. Large-scale funding necessary for the "big science" have favoured those social sciences in which theoretical innovations are possible with smaller grants.

21 There is certainly no need to catalogue every last discipline, however it is necessary to recognize the fact that some disciplines have over time transformed more than others, and that some of the definitions that were valid in the years following the Second World War should be reviewed and if necessary revised. A special case is that of geographers, whether physical (natural scientists) or economic (social scientists). They attend the same degree programmes, share the same civic and professional organizations, and internationally belong to the same International Geographical Union (IGU). The IGU in turn adheres to the International Social Science Council (ISSC) and simultaneously to the International Council for Science (ICSU) to which there are also affiliated associations of anthropology and psychology, but not all social sciences.

Geography therefore represents at least two cultures and can naturally contribute in overcoming the division between these different disciplines. Expressing itself through spatial definition of phenomena and events, and also with the aid of the latest geographic information systems, this discipline manages to compare and improve communication between different cultures and events through their location on the territory.

22 The Declaration of Rome (11/21/2014) for Responsible Research and Innovation (RRI) in Europe requires all members of society, civil society included, to be mutually responsible for processes and results of research. This imposes the necessity of collaboration in scientific education, the identification of priorities, management of responsibilities, and transmission of new knowledge to the civil society. In the summer of 2012, the European Commission published a series of measures to make the access to results of publicly funded research easier. These measures are known by the term "open access". This policy will facilitate the access to results to other researchers and companies. Moreover, as stated by Máire Geoghegan-Quinn, the European Commissioner for Research and Innovation, this practice will make more effective the investment of €87 billion. The necessity of both a multidisciplinary approach and the circulation of the results of scientific research, are now an integral part of all the funding of the European research programme HORIZON 2020, which will be granted between 2014 and 2020.

Human mobility as a key element for understanding social change

23 Human mobility has been one of the key themes of interest of the social sciences for a couple of decades now. This particular attention on the subject has followed transformations in the nature of both migration and tourist flows, in the context of advanced globalization, which has affected international trade, capital flows, and economic strategies. The new forms of human mobility have in turn influenced the social and cultural development and have been supported by progresses in information technology, and communication.

24 In contemporary culture there is a strong interrelation between global phenomena and local development. Human mobility is one of the most important ways in which this interrelation is expressed. Places once connected only by flows of the workforce, are now becoming increasingly interrelated by new forms of mobility that result in a significant change in lifestyles, consumption patterns, and political events. These new forms of mobility are also spreading in the context of substantial changes in the more traditional forms of economic migration. Human mobility takes different forms including migration and tourism, this relationship between the two constitutes a further aspect of scientific interest. Tourism is a form of mobility of variable duration, and is interdependent with other forms of migration. It in turn generates more distinct forms of migration such as those triggered by the demand for services, or those more consumerist that can take different shapes depending on duration and reasons, as in the case of seasonal migrations, holiday homes, migrations related to lifestyle changes or retirement. In the decade between 2000-2010, geography has been facing both the problem of re-definition of the concepts of migration and tourism, and the necessity to conduct further research on the synergetic relationship between the two (Hall and Williams, 2002). Several forms of migration generate, in fact, tourist flows, as the immigrant community can become not only the hub of tourist flows, but it can also originate tourist flows of people returning to their own country to visit friends and relatives.

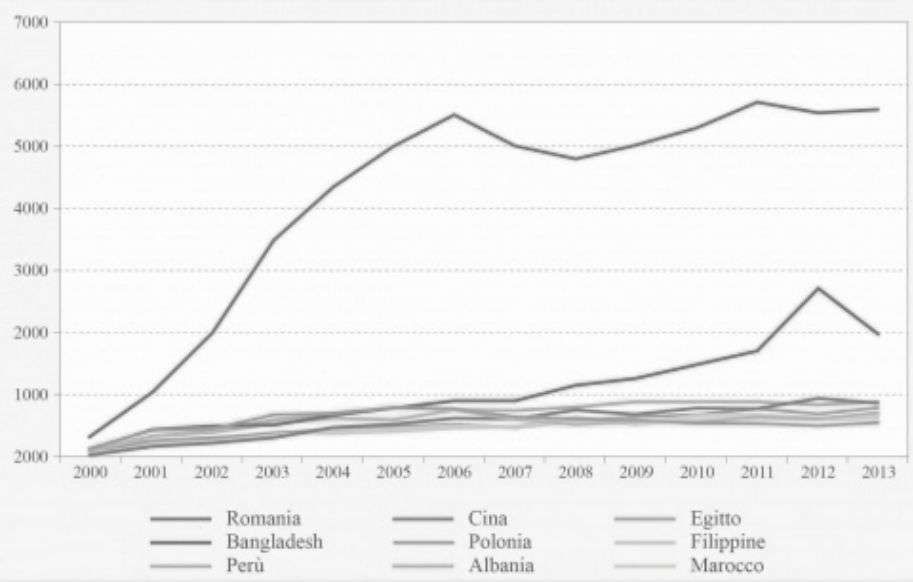
25 Urry (2000) proposes a sociological manifesto, which examines interdependencies and social consequences of all the different types of mobility of human beings, products, images, information, and waste products. This is the reason why the second part of the title of his book refers to “mobilities” for the twenty-first century. Mobility has to be considered both a geographical and a social phenomenon. Urry argues that social mobility has so far ignored the intersections of social classes, genders, and ethnic groups, with regions, cities, and places. On the basis of this statement the author indicates a new sociological dimension no longer anchored to the concept of human society, but oriented to the search for new paradigms such as networks, mobility and horizontal fluidity. Sheller (2011) historically reflects on the way in which sociology, in the context of the dynamic cultural environment of the 1990s, provoked a debate not only among sociologists, but also among scholars of geography, anthropology, architecture, urban planning, media theory and communication and art.

26 On the basis of this new multidisciplinary approach, parameters become those of sociology of fluids in which there are no points of starting or arrival; there is no specific perspective of reference, and speed and directions are more important then goals. Therefore come into play characteristics such as viscosity and impermanence, and come into existence walls that obstruct mobility but it should not be ignored the passage by capillary. Fluids’ intersections and hierarchical scales of capillary are centres around which authority is organized. In the same way different fluids intersect in “non-places” of modernity. Since 2000, the International Geographical Union (IGU) has established a Commission on “Global Change and Human Mobility (GLOBILITY) in order to explore the methodological premises of the evolution of population flows (Montanari, 2002). Researchers and professors of more than one hundred research institutes (50% European, the rest from all over the world) have joined GLOBILITY. Recent decades allowed researchers to benefit from the experience and the development of social sciences, and contributions not only come from developed countries of the northern hemisphere, but also from Africa and the Pacific. In order not to have a distorted vision of human mobility, attention is in fact being paid to have on board authors that can represent the views of both developed and developing countries. Even though the network has set up as part of the IGU, other researchers from other social disciplines have been invited to actively participate in GLOBILITY (Montanari and Staniscia, 2016).

Results and Discussion

27 Admissions to the Accident and Emergency Department of the Policlinico Umberto I from the 2000s to June 2014 were 1,908,240 in total. Check-ins of Italian citizens were 1,651,621; those of foreigners were 256,619. The trend of admissions to the Accident and Emergency Department has over time showed a steady and progressive increase for all national groups examined. A slight aberration can be observed only for the Polish population from 2005 to 2006 (Figure 1).

Figure 1. Distribution of admissions to Accident and Emergency Departments, per country (2000-2013).

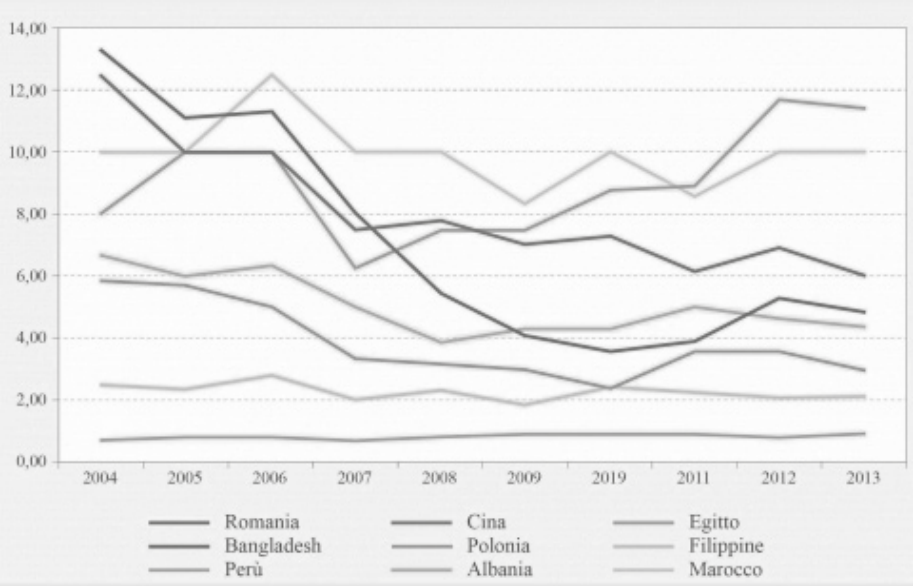


Source: authors' own elaboration

28 On the basis of admissions to the Accident and Emergency Department for the nine ethnic groups identified, it was taken into account the number of residents registered at the Registry Office of the municipality of Rome the 1st of January of each year. The comparable data are those between 2004 and 2013. Statistics for 2012 refer to the national census; therefore the number of registered foreigners may in some cases have not been correctly inserted in the database of the Registry Office. Over the period under consideration, the number of registered foreigners has slightly increased in the case of Egyptian citizens, it has grown by one half in the case of Polish citizens, three times for the Chinese, more than four times for Romanians, and nearly six times for Bengalis.

29 It appears to be also relevant to consider the coefficient of the number of hospitalizations per thousand of foreign citizens registered at the Registry Office. This coefficient can be examined either as evolving over time or can be compared year by year. If compared to the registered population, patients hospitalized over the 2004-2013 period mainly remain constant (Figure 2), or slightly increase in number (as in the case of Bengalis, Peruvians, Filipinos and Moroccans), but have also declined by half (Chinese and Poles) and a third (Romanians and Albanians).

Figure 2. Distribution of admissions to Accident and Emergency Departments, per 1,000 residents (2004-2013).



Source: authors' own elaboration, based on ISTAT various years

30 The analysis of the different reasons for admissions to the Accident and Emergency Department and the comparison between check-ins of the nine ethnicities examined and the Italian population, reveal the existence of specific diseases for each national group.

31 Cardiovascular diseases are more frequent in the Italian population of a higher average age than the immigrant community. The frequency of acute coronary syndromes appears to be less in immigrant patients, but the average age of occurrence is in this case significantly lower, especially for certain South-East Asian populations (confirming the data of the literature). Dodani *et al.* (2012) assume the cause to be genetic, however Jayasinghe and Jayasinghe (2009), McQueen (2008), Rahman and Zaman (2008), identify in the risk factors acquired by these migrant populations, the reason of the accelerated atherogenesis, responsible for early cardiovascular diseases. Cases of changes in blood pressure and heart failures are reported in South Americans. Even in this case, the peculiarity is represented by the young age of those affected. Miranda *et al.* (2013), El Khamlichi *et al.* (2001), Schneck and Biller (2005) also report the presence of diseases involving heart failure and acute cardiovascular events in the African countries of the Mediterranean basin, as confirmed by the results of this study.

32 Respiratory diseases are more frequent in the foreign groups. Acute respiratory infection is the disease most contracted, but it has not been found to represent any particular statistical significance against a specific ethnicity.

33 Polish people register a great percentage rate in the case of gastrointestinal diseases (principally gastro-duodenitis, chronic hepatitis and cirrhosis). Recent publications of the Department of Epidemiology of the National Institute of Public Health- National Institute of Hygiene of Warsaw document ineffective programmes of primary and secondary preventions for HBV and HCV.

34 Both Polish and Filipino citizens show a proclivity to contract diseases affecting the skin, and as far as the Filipinos are concerned, females contract a higher percentage of urinary infections (64% of those admitted to the Accident and Emergency Department are female Filipinos).

35 Admissions for tumours (particularly those affecting the female genitalia), and neoplasms of the blood and of the hematopoietic system specifically concern the Romanian population. This seems to be due to the lack of cancer screening tests (e.g. HPV tests) nationwide, as highlighted by Tornesello *et al.* (2011), Apostol *et*

al. (2010), Arbyn *et al.* (2009 and 2007) in their studies.

36 In diseases affecting females, the number of admissions due to pregnancy, childbirth, and postpartum complications, appears higher in all foreign national groups and particularly for younger women compared to the Italian group.

37 This remark particularly concerns the Romanian population, but also South-East Asians (especially Chinese and Bengali) and Albanians.

38 Considering the additional classification of factors influencing health status, and the use of the health system for supporting examinations (e.g. for poorly defined symptoms that do not fit in codified diagnosis; examinations and tests to assess age through bone X-ray), percentage values for these diagnostic groups appear to be higher in patients of foreign nationality. This is particularly true in the case of Bengali and Egyptian citizens as those values are four times above average. This figure may be due to the impossibility for foreign nationals to access those services, which are not provided by the system of emergency/urgency, and to the necessity of getting tests in other institutions (e.g. bone age).

Conclusions

39 The data analysis highlighted differences between nationalities for some diagnostic groups. It emphasized the relationship between those groups and certain ethnicities (the Romanian population and neoplastic diseases, the Bengali people and coronary heart disease at an early age, Peruvians and diseases of the circulatory system, the Polish population and gastro-intestinal diseases, Albanians and mental and dermatological disorders, Filipinos and genitourinary diseases especially for females, and the Moroccan population and vascular diseases). Identifying genetic ethnicity-related factors and individual risk components, both as alleged causes of diseases and therefore reasons of admissions to Accident and Emergency Departments, the analysis of the literature confirmed the findings of this study. Results of this analysis are particularly important in enhancing greater understanding of how diagnose particular diseases earlier, which is very useful when the patient's medical history is shielded by linguistic and cultural barriers. After the initial care provided in Accident and Emergency Departments, it would be desirable to be able to include these patients in prevention and care programmes.

40 Some pathologies and some admissions to Accident and Emergency Departments seem to refer to problems of another level. One of the findings emerged from this study consistent across all populations examined is the presence in the territory of a foreign female population facing pregnancy at a very early age (if compared to the pregnancy age of Italians). Over the years, the foreign female population has increased, perhaps for family reunion reasons. Such a path primarily requires hospital assistance for medico-legal and economic reasons. It would be desirable to be able to create sexual education programmes and give gynaecological assistance to foreign women beyond the immediate care provided in Accident and Emergency Departments.

41 A final observation should be made on improper admissions of foreign citizens to the Accident and Emergency Department (AED). This phenomenon is often linked to medico-legal problems that make the general medical assistance and the outpatient care inaccessible for foreign citizens without a residence permit. It would be very useful to create information points in AEDs on regulations governing the access to healthcare and treatments of immigrants.

42 The research results are particularly encouraging in terms of the possibility of establishing a collaboration between medical and social sciences to better

understand and plan ahead a situation that has become alarming for scale and consequences. Over the past year, in fact, the phenomenon of invisible flows has been impacting social, economic, and political life of the EU citizens. Hence the necessity of further investigating these issues. Moving from an analysis carried out on a transit node, the research team has therefore decided to conduct a structured study on how irregular forms of human mobility move in networks and transfer their problems on multiple nodes on both the Italian and European territory.

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Table des illustrations

Titre	Figure 1. Distribution of admissions to Accident and Emergency Departments, per country (2000-2013).
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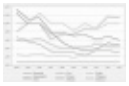

Titre	Figure 2. Distribution of admissions to Accident and Emergency Departments, per 1,000 residents (2004-2013).
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Original article

The accident and emergency department as monitoring centre of human mobility: the Bangladesh experience

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Abstract

Introduction: **the Accident and Emergency Departments (A&E-D) are privileged eyewitnesses of the health needs of a population that resides or transits in a given area. Through the experience acquired in Rome's Umberto 1° Policlinico's A&E, we report the experience gained the study results of admissions of citizens from Bangladesh are reported.**
Materials and Methods**: we conducted a retrospective study of patients that attended the A&E-D from 2000 to 2014. We isolated records of patients from Bangladesh, noting age, gender, reason for admission and the final diagnosis.**
Results**: data analysis showed 16,420 admittances due to of Bangladeshi citizens. With regard to considering the conditions that led Bangladeshi migrants to visit the A&E-D, it was noted that the diagnostic group mainly represented was "Injury and poisoning", "Symptoms, signs and ill-defined morbid conditions", "Diseases of the nervous system and sensory organs", "Factors influencing the state of health and recourse to health services" and "Diseases of the respiratory system".**
The group that presented highly interesting characteristics was the one relating to cardiovascular disease and among these, Coronary Syndromes. Its peculiarity lies in the fact that in the 130 cases considered the average age was 42 years +/- 8, much lower than usual in European countries.
Discussion: **the results on the types of diseases presented by Bangladeshi patients were discussed, and in particular the genetic causes, environmental interaction and the lifestyles that can justify the precocity of coronary disease in this population, according to studies reported in the literature. The results could have an impact on the organization of health care systems.**

KEY WORDS: bangladeshi population, emergency department, human mobility, observatory of health needs.

Introduction

The Accident and Emergency Departments (A&E) are privileged eyewitnesses of the health needs of a population that resides or transits in a given area. People with critical care who cannot find acceptance in other facilities turn to these structures either for temporary reasons (the A&E department is the only medical facility available 24 hours, every day and night, including holidays) and for bureaucratic / administrative reasons (A&E takes care of all those who enter it, even if not provided with any health care).
Thanks to the experience gained in the A&E of Rome's Umberto 1° Policlinico, we noted the presence of many patients of different nationalities; not only that, over the years there seems to be a change in the prevalence of different populations (presumably for political and socio-economic problems of the various countries of origin) and simultaneously, the prevalence of their pathologies that show their peculiarities in relation to those highlighted by the admissions of Italian citizens.
For this reason we assessed the characteristics and trends of pathologies regarding admissions of citizens of different nationalities.
We report the experience gained from the study of admissions of citizens from Bangladesh. We selected this population because we were interested by literature describing coronary artery disease (CAD) as a major public health concern and leading cause of mortality in Bangladesh. Bangladeshi people are easily prone to develop early onset CAD, which follows a progressive course and with a serious angiographic outlook. The underlying pathophysiology is little known. Genetic predisposition, high prevalence of metabolic syndrome and conventional risk factors also

play an important role. Lifestyle related risk factors, such as bad eating habits, excess fats, salt intake and low level of physical activity can play a role in the development of coronary artery disease.
Of all the countries of South Asia, Bangladesh has probably the highest rates of cardiovascular disease. Studies involving emigrants abroad noted that, among Asians, Bangladeshis people are more likely to develop CAD and are associated with a higher morbidity and related mortality.
Bangladeshi people seem to share a susceptibility to CAD with other populations of South Asia; however the interaction between genetic and environmental factors may underlie the increased risk causing the so-called "ethnic Bangladeshi".
CAD's pathogenesis remains unclear. The interaction between genetic and environmental risk factors probably contributes to the pathophysiology of coronary artery disease. "Classic" risk factors such as hypertension, dyslipidemia, diabetes mellitus and smoking undoubtedly play a key role (1). These factors, in various combinations, in a population genetically predisposed, may explain the high prevalence of CAD in Bangladesh.

Materials and Methods

We conducted a retrospective study of patients that attended the Accident and Emergency Department of Rome's Umberto 1° Policlinico.
We examined admissions from January 2000 to December 2014. Each admission is registered by the GIPSE Computer System (a software tool supporting the activities of the Accident and Emergency Departments that collects data that make up the information flows required to the Lazio Region), in which you input the patient's info, the reason for their admission, the relative priority code and it follows the path of the admitted patient until the outcome: discharge from the A&E, admission as inpatient, transfer to another hospital or death. It ends with the delivery of valid documentation for the purposes of law. It therefore gathers useful information for the assessment of the population's state of health. We separated patients from Bangladesh from about 2,000,000 admissions recorded during the 14 years of the study, noting age, gender, reason for admission and the final diagnosis, identified according to the international classification of diseases (ICD-9 CM: International Classification of Diseases – 9th revision – Clinical Modification). We compared the prevalence of this information with those of Italians, who represented the vast majority of citizens who, in the period of the study, have turned to the emergency room of our hospital.

On the subject of Bangladeshi citizens living in the town of Rome

The emigration from Bangladesh to Italy grew as a form of opportunistic migration. The influx started in the eighties for economic, social and even political reasons. Bangladesh has a population of one hundred and sixty million inhabitants (2015) of which 22% live below the poverty line. The flow of migrants was originally directed to other European countries but began to find that entry checks to Italy were far less strict than to other European countries, and also for subsequent regularization policy promoted by Italy in the second half of the eighties and the nineties. According to Istat legal Bangladeshi citizens in Italy numbered seventy thousand in 2009, reaching one hundred and fifteen thousand in 2015. The community has always been most consistent for the presence of illegal, temporary or permanent immigrants, variously assessed according to sources. Bangladeshis living in Italy are mainly individual immigrants who maintain economic and social relations with the family of origin (Yeoh, Graham, and Boyle, 2002).
Immigration procedures are based on a regular influx of migrants accepted by sponsorship, family reunifications or illegal immigrations. Italy is not necessarily the chosen objective for Bangladeshi immigrants, as the final destination is often defined by migration "facilitators" based on evaluations and opportunities at the time. Bangladeshi citizens officially registered in the City of Rome reside primarily in the 1st and 5th districts.
In 2013 over six thousand lived in the 1st district, whereas in the 5th there were just over five thousand six hundred, only difference being that in the 1st district there were only 7% of minors whilst in the 5th there were 33%, indicating that Bangladeshi families who integrated more in the roman area mainly lived in the 5th district. The 1st district shows Bangladeshi residences around the Termini station area, while the 5th district indicates mostly the areas near S.S. Prenestina such as Pigneto and Tor Pignattara, still within the catchment area of the Accident and Emergency Departments of the Umberto 1° Policlinico (2, 3).

Results

Data analysis from 2000 to 2014 showed 1,908,236 admittances in A&E; 16,420 of these were due to Bangladeshi citizens. The numerical trend showed a slight and steady increase from 2000 (116 admissions) to 2014 (2107) with a peak in 2012 when there were 2,775 admissions (Fig. 1).
The Bangladeshi population examined in our available data was mainly represented by male migrants. Admissions to A&E made by Bangladeshi men were 12460; those made by Bangladeshi women were 3961; in 19 cases the gender was not specified. Looking at the influx trend over time it was noted that while the male Bangladeshi population increased slowly and constantly, the female Bangladeshi population increased sharply 2010, doubling the number of admissions over the previous year and then continuing to steadily increase (Fig. 2).
The average age of Bangladeshi patients in the years 2000-2014 was 25 years, without fluctuations (2000: 28.5 years; 2014: 26 years).

The accident and emergency department as monitoring centre of human mobility: the Bangladesh experience

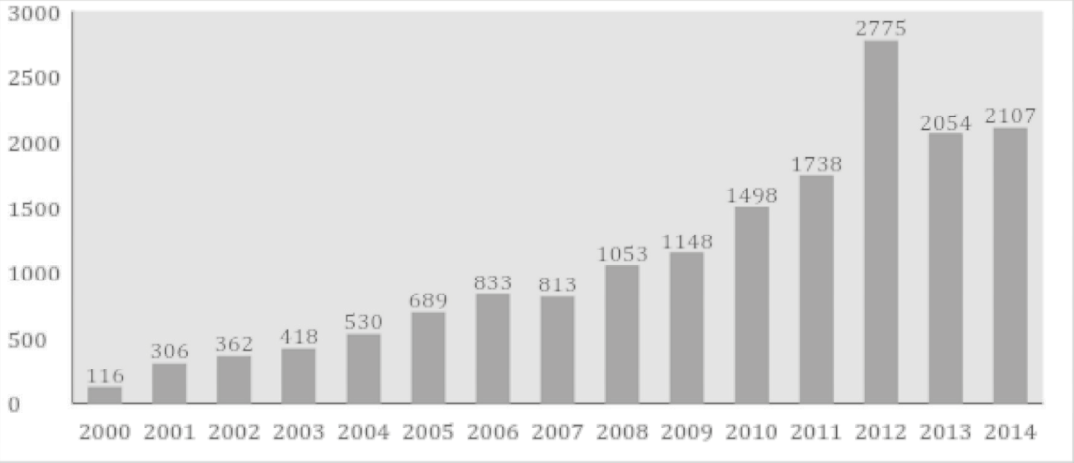
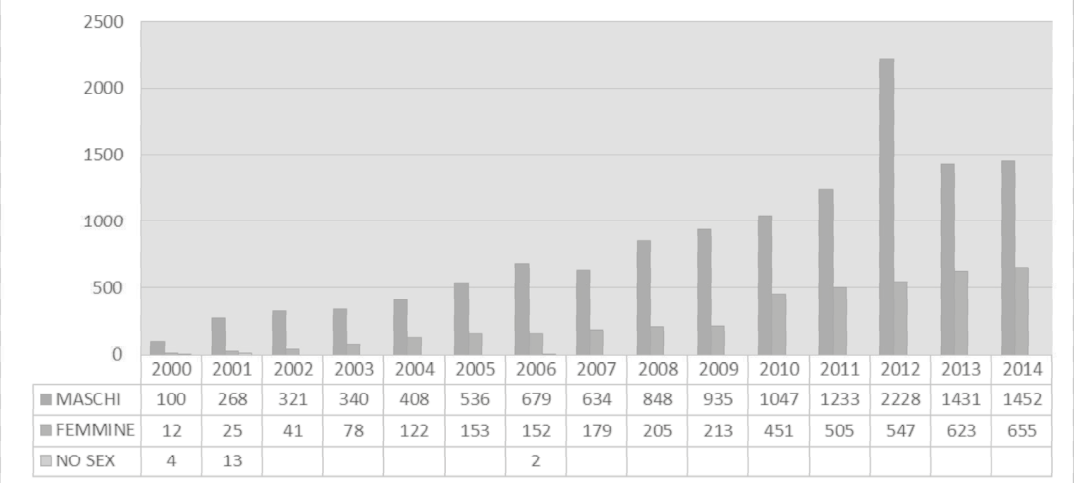


Figure 1 - Numerical distribution of admissions in A&E made by migrants from Bangladesh in the years 2000 to 2014.



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
MASCHI	100	268	321	340	408	536	679	634	848	935	1047	1233	2228	1431	1452
FEMMINE	12	25	41	78	122	153	152	179	205	213	451	505	547	623	655
NO SEX	4	13					2								

Figure 2 - Admissions breakdown by gender to A&E made by Bangladeshi migrants in the years 2000-2014 (see text).

The admissions by Bangladeshi citizens in the years 2000-2014 at the Accident and Emergency of the Policlinico Umberto I were grouped according to the diagnostic code assigned at the discharge from A&E in the 18 groups of the ICD-9-CM manual (Fig. 3).

With regard to the conditions that led Bangladeshi migrants to visit the A&E department, it was noted that the diagnostic group mainly represented in the period 2000-2014 was group 17 “Injury and poisoning”. The related diagnostic analysis would seem to indicate that the population of foreign migrants that visited the A&E department between 2000 and 2014 did so due to minor injuries (abrasions, fractures, bruises), probably caused by minor accidents at work. Another significant finding within this diagnostic group is the numbers of patients that comes in to A&E, but are not present on the premises of the Emergency department when called for the examination. This is largely for minor triage codes, so that they leave because of the long wait before the consultation.

Other diagnostic groups most represented were: group 16 “Symptoms, signs and ill-defined morbid conditions”, group 6 “Diseases of the nervous system and sensory organs”, group 18 “Additional classification of factors influencing the state of health and recourse to health services” and group 8 “Diseases of the respiratory system”.

Group 16 “Symptoms, signs and ill-defined morbid conditions” maintains a constant prevalence in time that reaches an average percentage value of 18%. Most represented diagnostic categories in 2000-2003 were chest pain and abdominal pain; from the year 2004 onwards abdominal pain and fever predominated. This diagnostic group includes a range of clinical symptoms which are not always possible to match to a precise diagnosis and that did not have a sense of urgency.

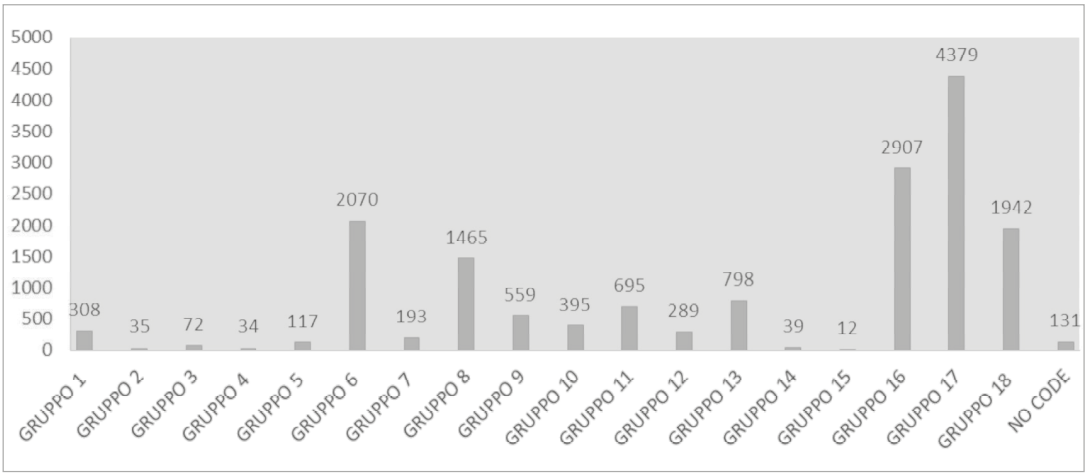


Figure 3 - Numerical distribution of admissions in A&E made by migrants from Bangladesh in the years 2000 to 2014 divided into diagnostic groups (Manual ICD-9CM).

Within group 6 "Diseases of the nervous system and sensory organs" the pathologies most represented were conjunctivitis and ear infections. From 2001 to 2002 this diagnostic group increased consistently, with a prevalence that went from 1.30 to 16.94%; in 2006 reached a peak figure of 21% and then stood on a constant average percent, until 2014, equal to 12%. The number of admissions in A&E related to diagnostic group 18 "Additional classification of the factors affecting health status and use of health services" rises sharply in 2009, reaching its peak in 2012 with 1051 admissions (number more than quadrupled compared to the previous year), readjusting on a lower setting in 2013-2014. In 2012 A&E admissions by Bangladeshi nationals reaches its peak and it's revealed as the only year in which a diagnostic group different from the Injury and Poisoning one was larger. Within this group the diagnostic code most represented was that of Medical-Legal examinations: these are investigations of presumed age. This type of check is requested by law enforcement agencies for kids of non Italian nationality without documentation, in order to prove their legal age and to define the admission path or the clandestinity status in the hosting EU country.
Within group 8, "Diseases of the respiratory system", the most represented pathologies are pharyngitis and tonsillitis; over time the trend appears constant and the group is considerable since 2000.
Observing the distribution over time by prevalence of the less represented diagnostic groups, a substantially steady trend can be noted; group 11 stands out, "Complications related to pregnancy, childbirth and the postnatal period", which increases abruptly, rising from 3 admissions in 2009 to 109 admissions in 2010, an increase which then remains constant and continuous for 2 years. It is interesting to note that 2010 is the year in which the number of admissions by the female population doubles its number of admissions to the A&E (Fig. 2).
Comparing the diagnostic groups' prevalence between Italian and Bangladeshi citizens, the latter shows a higher prevalence in the "Diseases of the respiratory system", "Complications related to pregnancy, childbirth and the postnatal period", "Symptoms; signs and ill-defined morbid conditions" and the "Additional classification of factors influencing the state of health and recourse to health services" groups (Medical-Legal examinations to prove legal age, monitoring of straightforward pregnancies) (Tab. 1).

Focus on ischemic heart disease

Having considered existing data in literature regarding the early onset of coronary heart disease in the population of Bangladesh, in this retrospective observational study we analyzed the prevalence of ischemic heart disease and risk factors associated with it among citizens of Bangladesh who have turned to the Accident and Emergency Department and between 2000-2014. The recruitment criteria in our study were: Bangladeshi nationality and a diagnostic code at discharge related to the chest pain. 452 A&E case files were thus selected. The subsequent criteria for inclusion chosen by us were: diagnosis of acute coronary syndrome in place at the time of admission to A&E and / or a history of ischemic heart disease and / or admission to a unit for cardiovascular disease; or CCU or CHEST PAIN Unit.
130 patients' diagnostic codes were selected, whose average age was of 42 years +/- 8; minimum age 20 years, maximum 71. Diagnostic codes related to "ischemic heart disease" (Ref. 410-414) were 35 including 12 positive anamnesis of prior ischemic heart disease; the average age was of 42 years.
Amongst the diagnostic codes relating to "Other dis-

Table 1 - Numerical breakdown of A&E admissions made by Italian nationals and those of Bangladeshi nationality, between 2000 and 2014, divided into diagnostic groups (Manual ICD-9CM).

	ITALY	BANGLADESH
GROUP 1	(1,82%)*	(1.84%)**
GROUP 2	(1,39%)	(0.25%)
GROUP 3	(0,39%)	(0.35%)
GROUP 4	(0,65%)	(0.19%)
GROUP 5	(1,07%)	(0.25%)
GROUP 6	(18,93%)	(13.78%)
GROUP 7	(3,98%)	(1.18%)
GROUP 8	(6,69%)	(9.5%)
GROUP 9	(3,31%)	(3.7%)
GROUP 10	(2,41%)	(3.01%)
GROUP 11	(2,28%)	(6.36%)
GROUP 12	(1,89%)	(1.9%)
GROUP 13	(3,98%)	(1.9%)
GROUP 14	(3,94%)	(0.24%)
GROUP 15	(0,32%)	(0.05%)
GROUP 16	(17,27%)	(19.42%)
GROUP 17	(32,78%)	(17.35%)
GROUP 18	(3,43%)	(14.57%)
GROUP 19	(0%)	(0%)

GROUP 1 INFECTIOUS AND PARASITIC DISEASE; GROUP 2 CANCER; GROUP 3 ENDOCRINE, NUTRITIONAL, METABOLIC AND IMMUNE DISORDERS; GROUP 4 DISEASES OF THE BLOOD AND HEMATOPOIETIC ORGANS; GROUP 5 MENTAL DISORDERS; GROUP 6 DISORDERS OF THE NERVOUS SYSTEM AND SENSORY ORGANS; GROUP 7 CARDIOVASCULAR DISEASES; GROUP 8 RESPIRATORY DISEASES; GROUP 9 DISORDERS OF THE DIGESTIVE SYSTEM; GROUP 10 URINARY SYSTEM DISORDERS; GROUP 11 COMPLICATIONS RELATED TO PREGNANCY, CHILDBIRTH AND THE POSTNATAL PERIOD; GROUP 12 DISORDERS OF THE SKIN AND SUBCUTANEOUS; GROUP 13 OSTEOMUSCULAR SYSTEM AND CONNECTIVE TISSUE DISORDERS; GROUP 14 CONGENITAL MALFORMATIONS; GROUP 15 SOME MANIFESTATIONS OF MORBID PERINATAL ORIGIN; GROUP 16 SYMPTOMS, SIGNS AND ILL-DEFINED MORBID CONDITIONS; GROUP 17 INJURY AND POISONING; GROUP 18 ADDITIONAL CLASSIFICATION OF FACTORS INFLUENCING THE STATE OF HEALTH AND RECOURSE TO HEALTH SERVICES; GROUP 19 ADDITIONAL CLASSIFICATION OF EXTERNAL CAUSES OF INJURY AND POISONING.

*** Percentages calculated on a total of 1,542,026 admissions to A&E by Italian citizens (January 2000-June 2014) ** Percentages calculated on a total of 13,868 admissions in 2010 in the to A&E by Bangladeshi citizens (January 2000-June 2014).**

eases of the heart" (Ref. 420-429) was a case of unspecified heart disease in a 46-year-old patient with a history of ischemic heart disease; ventricular tachycardia in a 33-year-old patient and 1 cardiac arrest caused by ischemia in a patient aged 44.

Were also selected 3 admissions in 2010 with a diagnostic code related to "unspecified acute pulmonary edema" with a history of ischemic heart disease; average age of 53 years.

Among the codes for "symptoms from the respiratory system and other chest symptoms" (Ref. 786), 89 cases were selected, later to be coded as NSTE-ACS including 56 with a history of prior ischemic heart disease; the average age of this group was 42 years.

Discussion

The data at our disposal show that the Bangladeshi population that came to our A&E between 2000 and 2014 was primarily represented by young males. This finding is to be related with the fact that it's mostly young working age men that migrate to our country. An interesting fact is an increase in admissions by females from 2010; this is probably due to the arrival in Italy of the companions of the Bangladeshi citizens that initially set off alone for economic and work reasons. Our data showed that admissions by Bangladeshi women for gynecological and obstetric problems prevail over Italian women's admissions. The use of hospital health care during pregnancy is probably linked to economic reasons.

With regard to the reasons for admission to A&E, it is apparent that the Bangladeshi population turns to the A&E mainly for small traumas, probably related to minor injuries in the workplace. Bangladeshis are mostly employed in the service sector (75.6%). In particular Bangladeshi manpower is occupied in the Hotel and Catering sector of activity (23.3%), and in the Trade field (27.8%). The industrial sector accounts for 24% of workers belonging to the community (4).

Another significant finding is the numbers of patients that comes in to A&E, but are not present on the premises of the Emergency department when called for the examination. It is mostly for minor triage codes (pain in various organs, fever, minor infections of the upper airways) and they leave because of the long wait before the consultation. The reasons that bring these people to A&E are mostly of secondary importance from a critical medicine point of view, since it is linked to diseases pertaining to general medicine. Foreign citizens who are not in compliance with residence permits and that are not in possession of the STP card (Foreigners Temporarily in the Country) only have the A&E department as their source of healthcare.

Amongst our figures there are particularly interesting ones regarding access to A&E for coronary heart disease: our records confirm those reported in literature that recognize a particular predisposition in South-East Asia for the early onset of coronary heart disease. It is not so much the number of individuals affected, but the earliness of the onset of coronary events: in Caucasians, events of acute ischemic heart disease occur on average around the age of 62 (INTERHEART study in 2008 which however, considered only patients admitted to the CCU or in the Cardiology Unit) in our study we highlighted an average age of 42

and among these, critical cases (one death from cardiac arrest, a case of T.V., three cases of Pulmonary Edema and 89 events of Acute Coronary Syndrome), 12 other cases had a history of coronary heart disease.

The age of our patients seems to also be lower than the one reported in the INTERHEART research (5), showing an average age of 51 for the onset of ACS in the population of Southeast Asia, although considering the scarcity of our sample and the location where the study was conducted (CCU and Cardiology in HINTERHEART and A&E).

Of all the countries in South Asia, Bangladesh has probably the highest rate of cardiovascular disease. The exact prevalence of CAD is unknown, there are only a limited and small-scale number of epidemiological studies available; the latest information indicates the prevalence of CAD in rural areas between 1.85% (6) and 6% (7) and 19.6% in a sample of urban workers (8, 9).

A recent study conducted in rural Bangladesh has shown a dramatic increase in cardiovascular disease from 1986 to 2006; age-standardized mortality rates for this disease increased by 30 times (from 16 to 483 deaths per 100,000) among men and 47 times (7 to 330 deaths per 100,000) in women (10).

Studies involving emigrants overseas have found that, among Asians, the Bangladeshis are more prone to develop CAD and are associated with higher morbidity and related mortality.

In New York they had more extensive and severe coronary artery disease with a 53% involvement of the three vessels compared with 26% of other ethnic groups (11).

In the UK Bangladeshi men have a higher mortality rate, 112% for CAD and 220% for stroke than other Europeans (12). Even among South Asians in the United Kingdom, Bangladeshis have the highest prevalence of risk factors for CAD among all ethnic groups (13).

The higher susceptibility of South Asians to CAD may be due to two factors:

1-genetic changes (increased prevalence of hereditary susceptibility related to coronary artery disease, specific to populations in South Asia): angiotensin-converting enzyme (ACE) apolipoprotein A (apoA) apolipoprotein B (apoB) apolipoprotein E (apoE) (14)

2-gene-environment interactions and adverse presence inflammatory biomarkers: homocysteine, C-reactive protein (CRP), interleukin 6 (IL-6), adipokines and thrombotic risk factors such as fibrinogen and plasminogen activator inhibitor (PAI-1) (15, 16).

Also present in cardiovascular risks are the organic factors:

1) It was first proposed that the relatively high incidence of diabetes mellitus was a possible explanation of coronary heart disease in Southeast Asia. However, it was found that the incidence of diabetes mellitus is lower than the incidence of CAD in this population, and it seems to be insulin resistance, rather than diabetes, to contribute to the higher prevalence of CAD in Asian Indians.

2) Most South Asians have a small body frame. Obesity, by its classic definition, is rare among Asian Indians, who however have a visceral mass higher than people of other ethnic groups with comparable body mass index (BMI). Fat distribution is focused in the abdominal space and this particularity is also present in subjects of a normal body weight. This factor has a direct relationship with an increased risk of CAD (17). Abdominal obesity contributes to the pathogenesis of insulin resistance.

3) In Bangladesh, about 20% of adults and 40-65% of elderly people suffer from high blood pressure. The high incidence of metabolic syndrome and related lifestyles such as obesity, salt intake in the diet and lower physical activity can play an important role in the pathophysiology of hypertension. Hypovitaminosis D as well as arsenic poisoning probably play a role in the etiopathogenesis of hypertension in the population of Bangladesh (18).

4) Coronary anatomy in Asian Indians is significantly different, with the most widespread disease that occurs at an earlier age and is a distinctive hallmark of CAD in South Asians. Compared to Caucasians, their coronary arteries appear smaller and the smaller aspect of the coronary angiography is attributed to the narrowing of the lumen caused by widespread continuing atherosclerosis. It is believed that the settlement of atherosclerotic plaque occurs quite early in these patients. Results from several studies have indicated that the Bangladeshi ethnicity is associated, with the probability greater than 3 times, to the possibility of presenting CAD on all three vessels at the coronary angiography (19).

The greater propensity to dyslipidemia, abdominal obesity, high levels of Lp (a), high levels from homocysteine and low levels from adiponectin have been grouped into an actual syndrome called “AAMSAI” (accelerated atherocoronary metabolic syndrome in the Asian Indians) (20).

In addition to these factors we have to report those linked to the environment and to lifestyles:

a) The dietary pattern can play a role in the etiology of coronary heart disease: the use of generous amounts of cooking oil, fried vegetables and salt added during preparation and pickles are important aspects of the traditional cuisine of Bangladesh (21). In recent years South Asian people showed significant changes in their eating behavior. The availability of low cost vegetable oils and fats has led to an increased consumption of them in low-income countries. All this is contributing to worsening cardiovascular risk factors, already present in the population in South Asia (22).

b) Low birth weight is common in India (36% of children born in Bangladesh have a less than 2500 g body weight) and could represent another potential risk factor for coronary heart disease among the natives of South Asia. It has been suggested that the adjustments made by the fetus in response to malnutrition could persist and increase the risk of atherosclerosis. Low birth weight may also increase the risk of developing type 2 diabetes, probably because of reductions

in mass of the function of beta cells. These findings support the intrauterine development pattern of the metabolic syndrome (23).

c) The reduced physical activity compared to European populations is an independent risk factor for the development of coronary artery disease (24).

d) Smoking is a common and growing problem in South Asian countries. Tobacco use is high among the population of Bangladesh (25).

e) Groundwater arsenic contamination in Bangladesh is also a recognized public health risk. An estimated 57 million people have been chronically exposed to groundwater with above normal arsenic concentrations and consumption of certain vegetables, especially rice and spices represents an important source of exposure. Chronic exposure to arsenic can facilitate systemic inflammation and vascular endothelial dysfunction, which can in turn increase the risk of cardiovascular disease (26, 27).

Our research provides little known information concerning the healthcare needs of a population migrated from a distant country in South East Asia. The duration of observations (14 years) and the size of the case (over 16,000 admissions to A&E) are variables that make emerging data reliable. These include information about acute coronary events taking a special interest, due to the case size and to the characteristic age of onset of this type of disorders, peculiarities that have attracted the interest of worldwide literature.

These last records however appear meager, although collected over a long period of time and the origin of the sample from a single point of observation, even though a big Hospital, would make desirable the involvement in this research of other Roman A&E departments to have a more precise idea of the city's reality and secondly of other European metropolitan areas to analyze the real impact over time of coronary artery disease in people so young and how the environment and lifestyles may change what is patrimony of the genetic code. The results could have an impact on the organization of the health care systems with the dual aim of drawing the attention of health care providers to early development of major cardiovascular events in populations of Southeast Asia and to place this young population at risk in an outpatient scheme for primary and secondary prevention.

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Utilization of big data to improve management of the emergency departments. Results of a systematic review

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Corrado De Vito

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Abstract

Background. The emphasis on using big data is growing exponentially in several sectors including biomedicine, life sciences and scientific research, mainly due to advances in information technologies and data analysis techniques. Actually, medical sciences can rely on a large amount of biomedical information and Big Data can aggregate information around multiple scales, from the DNA to the ecosystems. Given these premises, we wondered if big data could be useful to analyze complex systems such as the Emergency Departments (EDs) to improve their management and eventually patient outcomes.

Methods. We performed a systematic review of the literature to identify the studies that implemented the application of big data in EDs and to describe what have already been done and what are the expectations, issues and challenges in this field.
Results. Globally, eight studies met our inclusion criteria concerning three main activities: the management of ED visits, the ED process and activities and, finally, the prediction of the outcome of ED patients. Although the results of the studies show good perspectives regarding the use of big data in the management of emergency departments, there are still some issues that make their use still difficult. Most of the predictive models and algorithms have been applied only in retrospective studies, not considering the challenge and the costs of a real-time use of big data. Only few studies highlight the possible usefulness of the large volume of clinical data stored into electronic health records to generate evidence in real time.
Conclusion. The proper use of big data in this field still requires a better management information flow to allow real-time application.

Introduction

There is a huge and increasing interest on Big Data and its applications, even if there is not still a unique definition for it. Big Data could be defined as a massive volume of heterogeneous data [1], or as electronic data sets so large and diverse that they cannot be easily managed with traditional software [2]. But the clearest and common definition is through the "4 Vs": volume (scale or quantity of data), velocity (speed and analysis of real-time or near-real-time data), variety (different forms of data, often from disparate data sources), and veracity (quality assurance of the data). The first 3 Vs are found in most literature [3,4] and could be considered distinguishing characteristics of big data [5]. The fourth V could be considered as a goal [6]. Thus, the label “big data” refers to more than just the volume of data; it also refers to the use of a wide variety of sources, such as genetic sequences, social media, purchase records, mobile device tracking, medical monitoring devices, electronic health records (EHRs), wearable video devices, health-related mobile phone apps, and other electronic traces left by the progressive digitization of modern life [7].
Despite the challenges that big data needs to overcome, the advanced analytics that are promised through big data offer incredible opportunities for most stakeholders in health care. Emergency Departments (EDs) are one of the most important units of hospitals and one of the main way of patient's admission. EDs produce daily a vast amount of data and can really benefit from big data analytics which, in turn, may offer

a great opportunity to improve resource use, reduction of costs, optimize supplies and staffing, decrease wait times and eventually improve the quality of care provided to patients and outcomes [8]. Gathering also nontraditional digital information, such as social media (like Facebook and Twitter), Google Trends and environmental data could be useful to perform disease surveillance and to operate in real-time in emergency situations.

Two of the most important opportunities offered by big data in ED are the development of useful forecasting tools and simulation models [9]. Classic prediction models have few variables and need to be very simple, to be easily managed by providers, but with the advances in technology it can be possible to have tens or hundreds of variables enabling a more tailored medicine, able to manage patients with complex disease too. This prediction tools could consider the entire patient's clinical profile and benefit from nonclinical factors [10].

The aim of this systematic review is to analyze the results of the studies that implemented the application of big data in ED and to describe what have already been done and what are the expectations, issues and challenges in this field.

Methods

Literature search and eligibility criteria

To describe the application of big data in ED, a systematic review of the literature was performed between January 2017 and March 2017 through PubMed and Scopus databases, using the following search string: (big data) AND (emergency care OR emergency department). The articles were retrieved from electronic database and hand search of references of retrieved studies and duplicates were removed. After screening for title some articles were excluded. Articles were considered eligible if the studies focused on the topic of the application of big data in ED and were in English language. No restrictions were applied to type of publication (e.g. editorials papers, short reports, systematic review, conference proceedings, commentaries, books reviews, dataset) and to setting and country of the studies. Two authors reviewed abstracts and full text of the resulting articles and disagreements were resolved by consensus. Articles not pertinent to big data and management of ED or emergency care or not providing sufficient details were excluded.

Data collection and analysis

Two authors independently extracted results from the retrieved articles, disagreements were resolved by a third author. Reviewers used a summary table to identify the key points from each article. The most relevant trends founded were discussed by researchers during one more consensus meeting after which reviewers were able to identify some common themes that emerged about the application of Big Data in Emergency Department that permeated multiple articles.

Results

Globally, eight articles met the inclusion criteria and were included in the systematic review (Figure 1). Because of the relevant heterogeneity of emerged themes, the retrieved articles were categorized into specific subtopics. Researchers identified three subtopics described separately below: (a) management of ED visits; (b) ED process and activities; (c) prediction of the outcome of ED patients (Table 1).

Management of ED visits

Araz et al. [11], Ram et al. [12] and Scales et al. [13] investigated the possibility to use big data to predict the amount of ED visits in specific situations to improve the management of patient's access, triage and high-cost patients. First two studies correlated internet data with data from electronic health records (EHRs) and clinical data to predict the amount of ED visits. Araz et al. [11] developed, through a cross-sectional study, a forecasting model to better manage hospital and other health care resources and improve service quality in near real time during the seasonal influenza outbreak. To evaluate which were the most accurate variables to predict influenza-like-illness-related (ILI-related) ED visits, authors performed a correlation analysis using the following variables: Omaha and Nebraska Google Flu Trends (GFT) data, Douglas County positive laboratory test results for influenza antigen, Douglas County ILI surveillance data, and Nebraska ILI provider data. After the analysis to estimate ILI-related ED visits, they showed that the use of GFT data can greatly improve statistical forecasting and surveillance of ILI-related ED visits. Ram et al. [12] introduced a new prediction model to estimate the number of asthma-related ED visits in a specific area. Authors combined asthma-related ED visits data from EHRs, social media data from Twitter, internet users' search interests from Google and pollution sensor data from the United States Environmental Protection Agency (EPA), all coming from the same geographic area and the same range of time. By the analysis of the relationship between data from ED visits

with each data source, they showed that the higher prediction accuracy was achieved combining air quality data with Twitter data. The aim of Scales et al.'s [13] retrospective cohort study was to assess both the incidence and the variables associated with revisits to ED of patients affected by kidney stones. The data of all patients of California were collected from three databases: the California Emergency Department Database (SEDD) that collect the total sample of ED visits which do not lead to hospitalization; the California State Inpatient Database (SID) that collect also the ED hospitalizations; the State Ambulatory Surgery Database (SASD) that gather all the ED revisits that required urgent ambulatory procedures. Through multivariate analysis, the authors showed that the 11% of all patients had at least one secondary ED visit within 30 days of the first visit. Analyzing covariates of all the cohort study, the authors did not found differences in revisits proportion between males and females, while small difference emerged in Hispanic and young patients. Moreover, revisits were directly associated to insurance status (the risk was lower in patients with private insurance vs. Medicaid payee), and inversely associated to the density of urologic care in different residential areas and the performance of a complete blood count at the first ED visit.

Emergency Department process and activities

Three studies described how to increase the quality and safety of first aid management, creating real-world simulations using advanced technologies capable of capturing large data volumes [14, 15, 16]. Chong et al. [14] aimed to build an efficient operating system to improve the management of the EDs taking into account waiting time, occupancy, admission volume and staff numbers. The authors built a patient flow model integrating a qualitative phase (conceptual model development, expertise review, conceptual model finalized) with a quantitative phase (stock and flow development, model equations development, data integration, scenario design and testing, sensitivity analysis, model validation). Through the use of a system dynamic model, which is an approach to understand the nonlinear behavior of complex systems over time, the inputs (i.e. acute bed numbers, maximum waiting room capacity, average staff numbers per site), collected from different sources (expertise review, Hong Kong Hospital Authority, Hong Kong Census and Statistics Department statistics, Accident & Emergency Medicine Academic Unit), were integrated into the patient flow model to estimate the outputs (i.e. duration in ED, occupancy in waiting room, acute bed occupancy). A pilot simulation showed that modulation of some parameters, like staff number and bed capacity, can improve the time of permanence in the EDs during

daytime. Kuo et al. [15] described a methodology to improve the collection of data about patients' activities in order to build accurate models of ED processes and activities through the use of radio frequency identification (RFID) system. The RFID system consists in three components: RFID tags (embedded into a wristband given to patients during the registration in ED), RFID readers and middleware. The authors claim that such a RFID model can be used by the ED to examine the impact of various factors that happen inside the ED and to support in decision making paths. The aim of Bruballa et al. study [16] was to obtain knowledge about the ED behavior in emergency situations (e.g. pandemics, mass accidents), from data generated by a simulation of the real system. Data were generated by an ED simulator (modelled on a real system), integrated and stored in a data warehouse and then analyzed using data mining techniques to observe patterns and trends. The simulator included six primary areas (admission area, triage boxes, waiting rooms, diagnosis boxes, treatment boxes and x-ray area) and five different types of active agents (patients, admission staff, nurses, doctors and x-ray technicians). The authors believe how actually, the only way to best manage emergency situations is to use simulation model to better understand real situations that may arise.

Prediction of the outcome of Emergency Department patients.

Yang et al. [17] and Taylor et al. [18] described the potential use of big data in predicting health conditions of patients admitted in ED. Yang et al. [17] described how fractional information from different data sources (i.e. ambient non-invasive data sensors supported by appropriate collecting techniques), can be gathered in real-time and can be applied for specific studies, integrating these information with expert knowledge of clinicians into an automated learning process. As an example of the benefits of using massive data for early trauma outcome prediction, authors described the utilization of photoplethysmograph waveform, of the corresponding each-minute heart rate and of and peripheral capillary oxygen saturation measured through a pulse oximeter and of associated ECG to discriminate internal bleeding from non-bleeding patients and to predict autonomous resuscitation in a trauma center. In Taylor et al.'s article [18], a retrospective cohort study, the authors highlighted the strength of using large volume of data stored in electronic health records (EHRs) of health care systems to improve the quality and the timing of mortality prediction in patients admitted in ED with sepsis. Clinical data of adult patients admitted in ED with a diagnosis of infection or with systemic inflammatory response syndrome (SIRS) from October 2013 to October 2014

were collected from EHRs of four trauma center and include various information: demographic data, ED procedures, laboratory results, nursing interventions, past medical history, vital signs etc. All data collected were analyzed using three models (Logistic Regression Model, classification and regression tree model, Random Forest Model). The predictive accuracy of each model was compared with traditional clinical decision rules (CDRs) accuracy and validated analytic models (Confusion, Urea Nitrogen, Respiratory Rate, Blood Pressure, 65 years of age and older score, Mortality in Emergency Department Sepsis score, Rapid Emergency Medicine Score). They showed that the random forest model was more accurate in estimating mortality for sepsis than the traditional models, proving the usefulness of local big data-driven approach.

Discussion

The changes that take place in the health of a population show themselves explicitly within EDs that, for this reason are considered the 'canary in the coalmine for the healthcare system' [19]. Overcrowding in EDs is producing negative effects in different international contexts about patient care: delays in the treatment of serious illness, increase in patients who sign their discharge without being visited and, lastly, increase in mortality rates [20, 21, 22, 23, 24]. Many of these aspects and issues can be attributed to the inadequacy of accesses in the ED, providing us with a clue to identify weaknesses and critical problems within the primary care system, and, in a more general mind-set, about the management of psychological, social, and socio-economic support.
It is well known that access to the Emergency Room, and therefore the demand for emergency services by the population, is heavily dependent on timely and satisfactory access to primary care services as well as the distribution of risk factors regarding acute, chronic, traumatic, and mental illness, and, lastly, by the percentage of socio-economic vulnerable people in each territory or area.
This complex network of details and specific factors can be understood and studied through ED-based Big Data Research. Through the analysis of the situation in EDs, it is possible to create simulation models that work as sensors of the actual system, succeeding in helping to plan actions that can act as decision support to prevent Emergency Medicine from becoming the epicentre of the healthcare system [25].
Therefore, in noting the usefulness of such a system of data to support the measurement of a population's health needs, the critical aspect that lies in the analysis of the Big Data from EDs concerns the need to synthesize and summarize these data with other information sources, including those from the data banks of territorial health

services, social services, justice and legal services, educational services, etc. Other non-strictly medical data sources consist of trends that can be obtained from various web search engines or socials, such as Google Flu Trends, Facebook or Twitter. However, the accesses to a huge amount of data per-se is not a guarantee of success, and indeed poses new challenges, such as storage, quality, standardization, analysis, and interpretation of the data collected.

One of the biggest challenges in utilizing data generated from different sources is that data are often unstructured and non-standardized, making difficult to share them even within the same organization [26]. Furthermore, the quality of these data is often suboptimal [27] and most of the EHRs relies on self-reported data [26]. Data obtained from the web or from the socials often overestimate the variables of interest and are prone to trends manipulation [28]. Currently GFT is no longer publicly accessible [29].

Regarding the statistical analysis, a main challenge is represented by the hyper-dimensionality of the data, i.e. the individual characteristics greatly exceed the individuals observed. The statistical analysis techniques that are able to handle such a mass of data (i.e. machine learning, data mining, high-dimensional correlation) have not yet been clearly defined in their use in the medical field [30] and, above all, they are often used without a background theory on the relationships they want to examine [31].

Real-time implementation of big data in clinical context has been deepened little in literature, although it is a fundamental step for their daily use. As show by our systematic review of the literature, algorithms and models have been built to take advantage of big data to improve the management of different aspects of ED: management of visits, process and activities and outcome of patients. Although these models have been proved to be useful for better manage ED activities, like planning clinical and economical resources and improve clinical outcome in specific situation, they have been applied only in retrospective study, not considering the challenge and the costs of a real-time use of big data. Only few studies highlight the possible usefulness of the large volume of clinical data stored into EHRs to generate evidence in real time [32]. However, some issues about the globalization of these data emerged in literature [26]: fragmentation of data, language barriers, different terminology used, data acquisition and cleansing and lack of data standardization [26].

In conclusion, two of the most important opportunities offered by big data in ED are the development of useful forecasting tools and simulation models [9]. Classic prediction models have few variables and need to be very simple, to be easily managed by providers, but with the advances in technology it can be possible to have tens or hundreds of variables enabling a more tailored medicine, able to manage patients with

complex disease too. This prediction tools could consider the entire patient's clinical profile and benefit from nonclinical factors [27].
Processing Big Data and performing real–time actions in critical situations is a challenging task [1] that needs increasing knowledge and experience to make it possible in the near future.

Figure 1. Flow diagram for selection of studies included in the Systematic Review

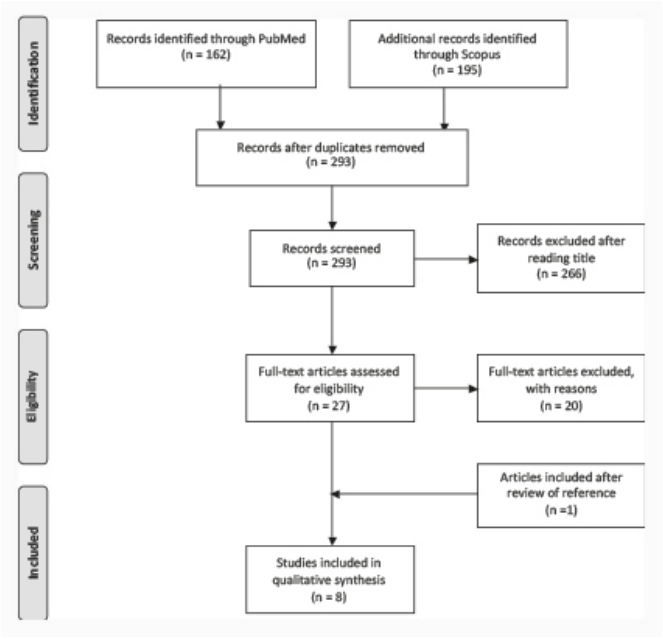

Table 1. Summary characteristics of the studies included in the systematic review

First Author	Affiliation	Country, Year of publication	Journal	Title	Type of publication	Specific topic	Data set	Type of study	Objective of the study
Ozgur M.Araz (11)	College of Public Health , University of Nebraska medical center	USA, 2014	The American Journal of Emergency Medicine	Using Google Flu Trends data in forecasting influenza-like-illness related ED visits in Omaha , Nebraska	Article in a periodic journal	Management of Ed visits	Data from: -ILI-related ED visits data; - Omaha and Nebraska Google Flu Trends data ; -Douglas County positive laboratory test results for influenza antigen; - Douglas County ILI surveillance data ; - Nebraska ILI provider data.	Cross-sectional	A description of a forecasting model with whom better manage hospital and other health care resources and improve service quality in near real time during the seasonal influenza outbreak.
Sudha Ram (12)	the Department of Management Information Systems, University of Arizona	USA 2015	IEEE Journal Of Bimedic Al And Health Informatics	Predicting Asthma-Related Emergency Department Visits Using Big Data (2)	Article in a periodic journal	Management of Ed visits	Data from: -hospital administrative data from Children's Medical Center of Dallas; - Google Flu Trends; - Twitter data; - Sensor data from EPA ;	Cross-sectional	A new prediction model elaboration to estimate the number of asthma-related emergency department (ED) visits in a specific area.
Charles D. Scales (13)	Duke Clinical Research Institute and Division of Urologic Surgery, Duke University Medical	USA 2015	Academic Emergency Medicine	Emergency Department Revisits for Patients with Kidney Stones in California (3)	Article in a periodic journal	Management of Ed visits	Data from: -California State Emergency Department Database (SEDD); -the California State Inpatient Database (SID) and the State Ambulatory Surgery Database (SASD); -part of the Healthcare Cost and Utilization Project (HCUP) of the Agency for Healthcare Research and Quality.	Retrospective cohort study	The evaluation of the incidence and the variation of a second readmission in ED of patients affected by kidney stones, and the preventable causes of revisits.
Marc Chong (14)	JC School of Public Health and Primary Care	China 2015	2015 IEEE International Congress on Big Data	Patient Flow Evaluation with System Dynamic Model in an Emergency Department (4)	Paper	Emergency Department process and activities	Data from: - Expertise review - Hong Kong Hospital Authority (HA) - Hong Kong Census and Statistics Department statistics - Accident & Emergency Medicine Academic Unit	NA	The creation of a simulation model to achieve greater efficiency taking into account waiting time, occupancy, admission volume, staff numbers in an emergency situation in ED.
Yong-Hong Kuo (15)	Stanley Ho Big Data Decision Analytics Research Centre	China 2015	2015 IEEE International Congress on Big Data	Embracing Big Data for Simulation Modelling of Emergency Department Processes and Activities (5)	Paper	Emergency Department process and activities	Data from: -Hospital data from The Prince of Wales Hospital (PWH), Hong Kong	NA	The use of RFI (radio frequency identification), to capture patient flow and activities in EDs through a simulation model which obtain all relevant treatment processes.
Eva Bruballa (16)	Tomàs Cerdà Computer Science School Universitat Autònoma de Barcelona (UAB) Barcelona, Spain	Barcelona 2014	2014 International Conference on Future Internet of Things and Cloud	Simulation and Big Data: A Way to Discover Unusual Knowledge in Emergency Departments (6)	Paper	Emergency Department process and activities	NA	NA	Obtain knowledge from data generated by simulation of the real system, integrated and transformed in a data warehouse and analyzed using data mining techniques to observe patterns and trends.
Shiming Yang (17)	University of Maryland School of Medicine, Baltimore	UK 2014	British Journal of Hospital Medicine	'Big data' approaches to trauma outcome prediction and autonomous resuscitation (7)	Review	Prediction of the outcome of Emergency Department's patients	NA	NA	With ambient non-invasive data sensors and appropriate collecting techniques, fractional information from different data sources can be gathered in real-time and be applied for specific studies.
R.AndrewTaylor (18)	Department of Emergency Medicine, Yale Univeristy	USA 2016	Academic Emergency Medicine	Prediction of in-hospital mortality in emergency department patients with sepsis: a local big data-driven, machine learning approach (8)	Article in a periodic journal	Prediction of the outcome of Emergency Department's patients	Data from: 1) urban, academic, level i trauma center 2) urban community-based, academic level ii trauma centre 3) community-based centre 4)sub-urban free-standing ed	Retrospective cohort study	The strength of using the large volume of data stored in electronic health records (EHRs) to improve the quality and the timing of sepsis mortality prediction of patients admitted in ED with sepsis.

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Emergency Department as an epidemiological observatory of Human Mobility: the case of Rome Metropolitan Area (EMAHM)

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Silvia Iorio

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A descriptive analysis of the visits to the ED of the Northern African population

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Abstract

This study focuses on the analysis of Big Data obtained from the Emergency Departments (EDs) of five hospitals located in the metropolitan area of Rome, Italy. The analysis of ICD9-CM discharge diagnoses shows clear differences between the Italian population and the North African population and confirms that many of the dynamics and health conditions regarding migrants are due to the inappropriate use of health services and, eventually, of the EDs. Our results afford indication about how we could identify shortcomings and critical issues within the primary care system and, more generally, in the management of psycho-social and socio-economic support for immigrant populations.

Introduction

This study focuses on the analysis of Big Data obtained from the Emergency Departments (EDs) in five hospitals located in the metropolitan area of Rome, Italy. Well enough aware that changes occurring in the use of healthcare services by the population are more explicitly expressed in and by frequency of accesses in ED, the Authors believe that the use of Big Data could provide useful indicators to build and plan actions that might carry out decisional support in order to avoid the turning of ED into the epicentre of National Healthcare System [1]. The current increase seen in healthcare inequality, as well as the global increase of the burden of chronic diseases and the complexity of their management in a

context of increasing socio-economic hardship, together with socio-demographic changes and immigration, are all components that contribute to the need of a strong understanding of the gears that drive the National Healthcare System. In fact, access to ED – and therefore the requests made to Emergency Services by the general population – largely depends on satisfactory access to Primary Care Services, as well as the distribution of risk factors regarding acute and chronic diseases, along with trauma, mental illnesses and finally, the percentage of socially and economically vulnerable individuals living in a given area [2]. Focusing Big Data on the analysis of pathologies-related ED accesses trends by non-Italian citizens, we are able to observe and perhaps better understand the healthcare needs of the immigrant population in Italy. For this study, we focused our analysis on the North African Nations (specifically from: Morocco, Algeria, Tunisia, Egypt and Libya), that in 2015 in Italy were 13.3% of the total foreign resident population (669.014 citizens) ([3]Dossier Statistico Immigrazione – Report on Immigration Statistics, 2016). The Italian political-regulatory approach regarding the foreign population provides for the full inclusion of immigrants in the system of health protection and guarantee of this right, on equal terms and opportunities with the Italian citizens. In addition, the right to health care has also been extended to those who live in Italy in conditions of legal irregularity (Temporarily Present Foreigners – or under the Italian acronym “STP”), who are guaranteed, in addition to urgent care, even standard healthcare provision and preventive medical and healthcare programs. The study of immigrants accesses in ED, therefore, allows us to observe not only the regular foreign population, but also the whole range of people who are irregularly (or illegally) in Italy, who in many aspects are difficult to

trace or describe. Moreover, through the analysis of the accesses and use of the ED by non-Italian citizens, we can understand the actual impact of the legislation on a specific group of immigrant population in Italy. This type of analysis becomes more significant in that we now face changes in migratory patterns: migration today is more related to circumstances that induce populations to leave their areas of origin than to factors that attract them to their destinations. This could lead – and we are currently seeing the initial impact – to a more loosely presence of new migrants in Italy, represented by people who are no longer necessarily interested in establishing in the country [4]. On one hand, Italy is managing an advanced phase of integration, showed by a large number of people with long-term residency permits, families reconciliations and the growing acquisitions of citizenship. On the other hand, the nation is facing the emergence of new incoming immigrants, increasingly motivated by the search for international protection rather structured or organized immigration projects. From this point of view, the analysis of the EDs accesses allows us to obtain a fairly faithful description of the health demands of individuals who pass through or remain in the city of Rome [5]. The use of Big Data can certainly improve the global Health Care System, however, even more, using this amount of data within an interdisciplinary perspective, might act as a compass for adequate health planning, facilitating development in view of evidence-based healthcare systems.

Methods

Data on EDs accesses from 1999 to 2014 in Umberto I University Hospital, San Giovanni Hospital, San Camillo Hospital, Tor Vergata University Hospital and Pertini Hospital were retrieved from the information system

"Gestione Informazione Pronto Soccorso Emergenza" (GIPSE), that records the information on patient charts and the entire route within the Emergency Department (ED), from triage to discharge. Through the nationality variable, the accesses were grouped into: Italians, Algerians, Egyptians, Libyans, Moroccans and Tunisians. The descriptive statistics of accesses for year, gender, age, and main diagnostic category by ICD9-CM, triage, and outcomes were calculated for each population. Statistical analysis were performed using Stata 15.1 (Statacorp LP, 4905 Lakeway Drive, College Station, Texas 77845 USA).

Results

From 1999 to 2014, 6.108.744 patients accessed the ED of the five hospitals (Umberto I, Tor Vergata, San Giovanni, San Camillo-Forlanini and Pertini). Of these, 5,150,377 patients were Italians (84.3%), North Africans were 73.025 (1.2%), other foreign people were 653.618 (10.7%), Italians born abroad were 159.561 (2.6%) stateless were 4.404 (0.1%) and patients with no nationality indicated were 67.759 (1.11%). Italians born abroad were separated from Italians because it was impossible to distinguish between foreigners who have acquired residence and Italian citizens born abroad.

Over the years, Italians accesses to ED were essentially stable, going from 98.1% in 1999 to 97.7% in 2014. The trend of the accesses of the Northern African populations, excepting for Libyans, was quite similar, showing a sharply increasing trend during the period 1999-2003 and then, a more slightly increasing trend until 2014, except for Algerians that instead had a decrease until the end of the study period. Libyans showed a completely different trend: a first period, from 1999 to 2004 with a sharply increasing trend, then a slightly

decreasing one until 2010, and after that point again a growing trend till 2014 (Fig 1).

During the period 1999-2014, the overall prevalence of TRIAGE codes was 13.1% for white codes; 69.4% for green codes; 15.6% of yellow codes; and 1.9% for red code. Codes prevalence for the Italian population was very similar to overall prevalence, while the one of Northern Africans was slightly different. Algerians, Egyptians, and Moroccans presented similar frequencies of triage codes, with a higher prevalence of white codes and a lower prevalence for most urgent conditions (i.e. yellow and red codes) than Italians, while Tunisians had a higher prevalence of red codes than Italians. Libyans showed a peculiar pattern, having lesser white codes prevalence (10.1%) and higher level of yellow and red codes (22.2% and 3.2%, respectively) than the other populations (Fig. 2)

As regards the ICD9-CM diagnoses categories, overall the most frequent was “Injury and Poisoning” (group 17:320-389), that was responsible for the 33.3% of the accesses, followed by “Symptoms, signs, and Ill-defined conditions” (18.9%); “Diseases of the Nervous System and Sense Organs” (9.5%); “Diseases of the Respiratory System” (6.4%), “Diseases of the Circulatory System” (6.3%); “Diseases of the Musculoskeletal System and Connective Tissue” (4.8%), “Diseases of the Digestive System” (3.8%), “Complications of Pregnancy, Childbirth and the Puerperium” (3.3%), “Diseases of the Genitourinary System” (2.8%) and “Mental Disorders” (2.3%), while the remaining presented very low

percentages. Italians percentages are absolutely comparable to totals for each diagnosis group. For "Injury and poisoning" category Algerians had the highest percentage (33.9), which is very close to Italians (33.3%), while the rest of Northern Africans varied from the about 27% of Egyptians and Libyans, whom had the lowest percentages, to the 33.9% of Algerians, which had the highest occurrence of these diagnoses category. About "Symptoms, signs, and Ill-defined conditions" Libyans had the highest occurrence (24.1%), while Algerians had the lowest (17.1%), For the "Diseases of the Nervous System and Sense Organs" category all the Northern Africans had an homogeneous behaviour, with a lower prevalence compared to Italians (9.6%), going from 6.2% of Algerians and Tunisians to 8.1% of Moroccans. About the diagnosis category "Diseases of the Respiratory System" Libyans and Italians were similar, showing the lowest values (6.2% and 6.4%, respectively), while the range of the rest went from 7.9% of Tunisians to 9.0% of Algerians. Evaluating differences in the group of "Diseases of the Circulatory System" we found that Libyans had a very higher percentage (8.6%) respect to other populations, where Italians had 6.4% and the rest of Northern Africans varied from 1.8% of Moroccans to 4.5% of Tunisians. Also for "Diseases of Musculoskeletal System and Connective Tissue" Italians and Libyans presented the lowest values (4.8% and 5.0%), while the others varied from 6.2% of Moroccans and Tunisians to 6.7% of Egyptians. In "Diseases of the Digestive System" there were not important differences. Libyans showed lower values in the category "Complications of Pregnancy, Childbirth and the Puerperium" (2.4%), while Moroccans and Algerians had the highest ones (5.4% and 4.7%, respectively). Absolutely no differences emerged in the category "Diseases of the Genitourinary System" (range 2.6-3.3%). About "Mental Disorders" category Algerians

and Tunisians showed a higher value (5.4% and 5.0%, respectively) than the other populations, which varied from 1.7% of Egyptians to 4.3% of Moroccans.
Looking at other diagnosis categories emerged some other differences, even if the percentages in general are very low. It is the case of Egyptians whom distinguished from others for the category "Persons without reported diagnosis encountered during examination and investigation of individuals and populations", for which had 4.1%, while the rest, Italians included, varied from the 0.4% of Libyans to 1.5% of Tunisians. Libyans showed the lowest values in the group of "Infectious and Parasitic Diseases", where they had 0.9% while all the rest varied from 1.3 of Tunisians to 1.8% of Algerians and also in the group "Persons encountering health services in circumstances related to reproduction and development" were they had 1.2%, while the remaining varied from 1.5% of Tunisians to 3.2% of Moroccans.
Libyans had higher percentages in: "Neoplasms" with the 2.0% while the others varied from 0.4% of Algerians to 1.0% of Italians, "Endocrine, Nutritional and Metabolic diseases and Immunity Disorders" (1.2%), while the rest went from 0.5 of Moroccans and 0.7% of Algerians and also in "Diseases of the Blood and Blood-forming Organs" (Libyans 1.1%, where the rest varied from 0.3% of Moroccans and 0.6% of Italians and Tunisians). For all the others diagnosis categories all the populations were absolutely comparable, having not significant differences in percentages (Data not shown).
Outcomes at the ED were grouped in seven categories: "Doesn't answer or left" (8.1%); "Discharged to home (63.9%); "Discharged to ambulatory care" (1%); "Reject the hospitalization" (6.7%); "Hospitalized or transferred to other structure" (20.1%); "Died in ER" (0.2%); "Dead on arrival" (0.1%). The percentages of the outcomes of the Italian citizens were similar to the overall prevalence,

while Northern Africans showed some differences. In particular, all Northern Africans showed higher values for "Doesn't answer or left", ranging from the about 10% of Libyans and Egyptians to the 17.5% of Tunisians. Libyans showed the lowest prevalence of "Discharged at home" (52%) and the highest prevalence of "Reject hospitalization" (8.3%) while the other population did not differ greatly from the overall prevalence (60.2%-66.8% and 6.1%-6.8%, respectively). All North Africa population had lower prevalence of "Hospitalized or transferred to other structure" (from 13.8% of Egyptian to 17.1% of Tunisians), with the exception of Libyans that again presented the highest prevalence among all groups (27.5%). The categories "Died at ER" and "Dead on arrival" there were not great differences among the populations (0-0.3% and 0-0.1%, respectively). (Fig. 3)

Discussion

Despite the differences emerged among the countries of origin, the analysis in this study shows a general increasing trend of ED using by the North African population, over the years. This should lead to greater investments in terms of research and public health measures. Along general lines, the analysis of triage codes assigned to ED patients showed for the entire North Africa populations a higher percentage of not urgent codes (white codes) compared to the Italian population, and generally a lower percentage of codes that require urgent care (yellow and red codes) [6]. The analysis of ICD9-CM discharge diagnoses showed clear differences between the Italian population and the North African population. In particular, the latter shows a higher prevalence of diseases regarding the respiratory system, the musculoskeletal system, pregnancy

complications and mental disorders. In addition, the inappropriate use of the ED, which clearly emerges from the analysis of the outcomes, is of considerable interest to nationwide healthcare. Along with administrative and bureaucratic aspects, various factors influence access to Health Care Services: heterogeneity of health services and lack of knowledge of local services; differences in individual physical and psychological characteristics; linguistic and cultural barriers.

Furthermore, socio-economic vulnerability that often exacerbates the potential of integration and therefore the possibility to communicate correctly with the community-based services have a noteworthy effect on access to healthcare services [7]. These obstacles likely contribute to an improper use of emergency services by immigrants, which goes hand in hand with seldom-used preventive care and primary care (e.g. family doctors) services. Policies and practices aimed to strengthening the performance of primary care for immigrants and refugees, fall under a broad range of migrant-sensitive healthcare policies. Primary care is probably the most appropriate level of action for immigrant population. The possibility to access this level of care by the foreign population in the host country is currently quite difficult for immigrants and refugees in particular [8]. In this regard, it is interesting to note that the higher frequencies detected concern specifically the complications during pregnancy, childbirth, puerperium and respiratory illnesses, most of which are avoidable if treated at a community-based level. It is also quite evident that the geographical area of origin represents the variable that most characterizes the differences found between Italians and foreigners from North Africa, in particular with regard to the Libyan population, for whom we believe it will be necessary to pursue a more comprehensive studies that could help to better unify

the data concerning the trend of migratory flows with those concerning behaviour towards healthcare services use. Literature dealing with the health of migrants has often focused on immediate emergencies arising from migration and immigration [9], structuring policies that have been limited to targeted interventions for specific diseases or conditions, while a more comprehensive approach in terms of policies must be developed. As clearly seen in the reported picture of North African population data in the five hospitals of Rome, there is no clear definition of emergencies requiring intervention on a specific disease and condition, but rather an implementation and strengthening of primary care for the immigrant population. Policies aimed to improving access, quality, organization and efficiency of primary care should be implemented during the arrival phase at the destination country as well as in the following period.
Many of the dynamics and health conditions regarding migrants are due to the inappropriateness of their use of the ED, offering indications on how we could identify inadequacies and critical issues within the primary care system and, more generally, in the management of psycho-social and socio-economic support for this part of the population.

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Emergency Department as an epidemiological observatory of Human Mobility: the experience of the Moroccan population

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Abstract

We conducted a retrospective study of the accesses to the Emergency Department registered from January 2000 to December 2014 in 5 major hospitals in the Metropolitan Area of Rome. We extrapolated data relating to patients of Moroccan origin from about 5 million total accesses, so we compared with Italians data which, in the same period, came to ED.
The Moroccan population is distinguished by a larger number of diagnoses belonging to the ICD-9 code of Infectious Diseases and, more precisely, to Respiratory Infectious Diseases. There are also no differences in the assignment of such diagnoses to

Moroccans with Italian citizenship, and this led to think that this could play an important role in the use of the ED and moreover that enrollment to the National Health Service may reduce its inappropriate use.
Regarding to Degenerative Disorders, the result of our analysis is quite emblematic, showing that the accesses to the ED is due to Cardiovascular Diseases: 6.33% of Italians' accesses against 1.81% of Moroccans and 2.36% of Moroccans with Italian citizenship. The main explanation for this difference is, obviously, due to the age of the population: about 60% of Moroccans who accessed to ED was less than 40 years old.
It is interesting how, in the field of Cardiovascular Diseases, Moroccans have a lower percentage of diagnosis compared to Italians for acute diseases and a greater percentage of diagnoses for chronic diseases, suggesting once again that accesses to ED for migrants often is due to the inability to use the general services of the National Health Service.
In conclusion, from the point of view of the Emergency Department, Migration Medicine still has Infectious Diseases as the main reason for access. Degenerative Disorders remain a prerogative of the Italians, but we could certainly assume that the Moroccan population would develop at some point with the aging.

Introduction

The problem of migratory flow of people is very ancient, and processes due to globalization and/or political issues led to new kind of human mobility.
This contributes to shift social and economic inequalities, within the countries that host migrants, increasing the burdens deriving from their needs.
We can consider Emergency Departments (EDs) as privileged observers of population health needs which reside or pass in a given area: people who cannot access to other facilities address to ED because it is the only Healthcare Facility avaiable 24-hours a day, including holidays, either for administrative issues, because ED takes care of all patients who access, even if not enrolled in the National Health Service. These characteristics are particularly related to the migrant population, people often in need and without alternatives.
ED thus becomes the only traceability tool for people who otherwise would not leave any sign, having actually no economic resources, residence or even identity card. This is true also from a chronological point of view, since we can observe the variation over time of Health needs of a given population.
To this aim, we conducted a retrospective study of the accesses to Rome metropolitan area EDs, from January 2000 to December 2014. After having generally studied the North African population facing the Mediterranean basin (ITJEM n.1/18), we are going now to document specific data about Morocco population and their peculiarities.

Demographic and health characteristics of Moroccans in Italy and in Rome

The Moroccan community appears since the 70's, among the main protagonists of the migration phenomenon in Italy, also due to the geographical proximity of the countries.
Migration numbers have constantly grown up, leading the Morrocans to stand among the first three populations of immigrants residing. [1]
The latest ISTAT data, relating to Moroccan migrants present in the Italian territory until the 1st January 2015, reported 518,357 people (55.4% men and 44.6% women), equal to 13.2% of all non-EU citizens. The main reason to explain these numbers could be the "reunification with the family" (66% of total), instead the number of new entrants seems decreasing.
Furthermore, the number of Moroccans who have acquired Italian citizenship increased (29,025 in 2014, +14% compared to the previous year). This has a substitute effect: the number of non-EU citizens decreases in favor of "new" Italian citizens of foreign origin.
In 2015, the average age was 30 yo. Altogether almost half of Moroccan citizens was <30 yo (46% of total), while 14% was >50 yo. 71.7% of Moroccans live in the northern regions, 13.95% in the southern ones and 14.3% in the central Italy.
In Lazio reside at least 3% of Moroccans, the largest part of which in Rome and itsprovince: on 1st January 2015 the numbers were 13,336 people, with a growth of +4.1% compared to the 2014. 62.6% of these live in Rome. [2.3.4.5.6]
The diseases that affect the Moroccan community in Europe, according to the scientific literature, are those ones related to cardio and cerebrovascular systems. Related risk factors are hypertension [7,8], obesity [9,10,11], diabetes [12,13,14]; the same widespread in both the countries, origin and residence.

Aim of the study

This study assesses the health status of a Mediterranean basin population next to Italy, quite numerous because of its migratory flow, in order to record any peculiarities and possible changes in health status over the years, compared to Italian ones.
This population was chosen because of the above characteristics and the relative stable residency and inclusion in our social context.
Emergency Department was also chosen as an observatory tool, even if very unusual for such studies.

Materials and methods

We conducted a retrospective study on patients who referred to the Emergency Department of five hospitals in the Rome metropolitan area: Policlinic Umberto I, Policlinic Tor Vergata, San Camillo Forlanini Hospital, San Giovanni Addolorata Hospital, Sandro Pertini Hospital.
We examined the ED accesses from January 2000 to December 2014. Each access is registered by the GIPSE computer system (which records the activities in ED and collects data requested from Lazio Region) in which patient information is entered, together with the reason of admission, the relative priority code and the clinical outcome: discharge, hospitalization, transfer to another hospital or death.
Furthermore, it collects useful information about health status of the population.
We extrapolated patients from Morocco from approximately 5,000,000 accesses recorded during the 14 years of the study, noting age, gender, reason access and final diagnosis identified according to the international classification of diseases (ICD-9 CM: International Classification of Diseases-9th revision-Clinical Modification).
We compared the prevalence of this information with the one of the Italians, the majority of the citizens who, during the period of the study, came to the Emergency Department of the five Roman hospitals. Some data relating to the natives of Morocco were compared with those relating to other populations in North Africa.

Statistical analysis

Statistical analysis was performed using the Chi-square Test to compare the different citizenships total infections and respiratory infections with their relative hospitalization. All tests were performed in two study-arms. Poisson regression models were constructed to identify variables independently associated.
The variable "Citizenship" (0 = Italian citizens, 1 = Moroccan citizens, 2 = Italian citizens born in Morocco) was treated as a "dummy" variable, using Italian citizenship as a reference (0).
The following variables have also been added: "gender" (0 = female; 1 = male); "age" (continuous v.); "2000-2014 time interval" (continuous v.), "triage code assigned to access" (categorical v.) and "outcome" (categorical v.). A value of p less than 0.05 was considered significant.
The tests were performed using the Stata 15 software (Statacorp LP, 4905 Lakeway Drive College Station, Texas 7784 USA).

Results

Figure 1 shows the data related to all the accesses in the five Emergency Departments object of the study, in the period 2000-2014. We have only considered and compared the data related to the accesses of Italians and Moroccans.
The analysis of the data showed 4,574,571 accesses in the ED; of these, 4,556,593 refer to Italian citizens, 15,693 to Moroccan citizens and 2,285 to Moroccans with Italian citizenship. The trend shows a constant increase in accesses by Moroccan citizens from 2000 to 2014 with a peak in 2013 of 1,476 accesses (Figure 2).
The Moroccan population examined in our data is mainly represented by male immigrants (62.4%) and the average age of the population was 33 years. Only 3.46% was more than 60 years (against 28.17% of Italians), while 12% were less than 18 years old (Figure 3).
The diagnoses assigned to Moroccan discharged, from 2000 to 2014, were grouped according to the diagnostic codes of the ICD-9-CM and were compared with those of the Italians and Moroccans who have obtained Italian citizenship.
The most frequent causes of ED access for Moroccan citizens were: Traumatism and Poisoning 30.78% (ICD-9-CM 800-999); Ill-defined signs and symptoms 19.19% (ICD-9-CM 780-799); Nervous System and Sense Organs Diseases 8.16% (ICD 320-389); Respiratory System Diseases 8.1% (ICD-9-CM 460-519); Infectious Diseases 7.72%.
In the context of the ICD diagnoses we have particularly considered the infectious diseases and the subgroup of respiratory infectious diseases (which were the most numerous), because in these groups significant differences between the Moroccan and Italian population appeared.
Diagnoses related to other ICD-9 categories do not find particular differences from those related to the Italian population (Figure 4).

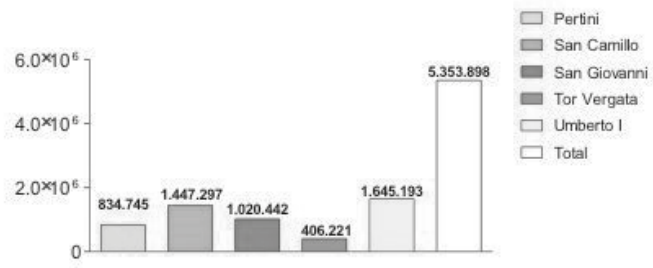


Figure 1

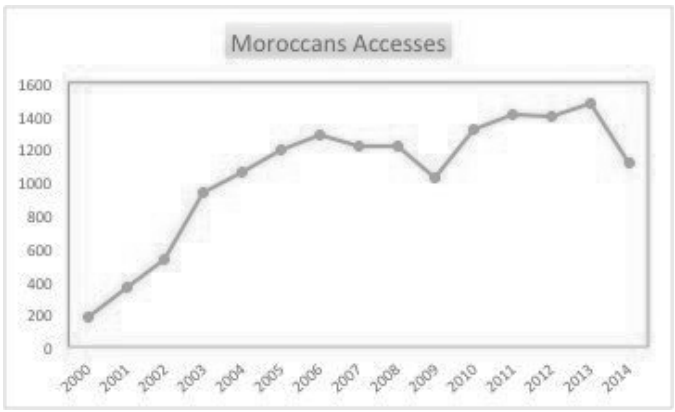
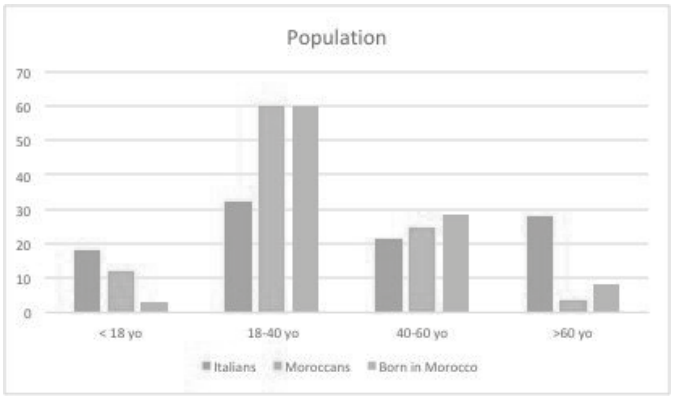


Figure 2



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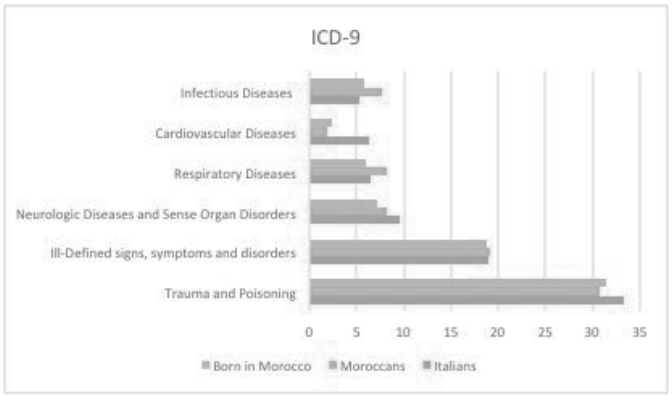

Figure 4

Infectious diseases

This group of diagnoses includes diseases of infectious origin of the various classes ICD-9 with a total of 244,779, which 243,568 were Italians, 1,211 Moroccans and 133 Moroccans with Italian citizenship.

With the Chi-square Test a statistically significant difference was observed in the accesses that hesitate in diagnoses of this category in the comparison between Italians and Moroccans (5.3% vs 7.7%, $p < 0.001$) and between Moroccans and Moroccans with Italian citizenship (7.7% vs. 5.8%, $p < 0.001$), but not between Italians and Moroccans with Italian citizenship (5.3% vs. 5.8%, $p = 0.313$) (Table 1).

The Poisson Regression indicated that both the Moroccan nationality (IRR: 1.27; CI 95% 1.20-1.34, p <0.001) and the Moroccan origin of Italian citizens born in Morocco (IRR: 1.34; CI 95%: 1.13- 1.59, p <0.001) are independently associated with a greater risk of having assigned a diagnosis within this category. The same is true for the female gender (IRR: 0.94; CI 95%: 0.93-0.94, p <0.001), while the risk decreases with increasing age (IRR: 0.96; CI 95%: 0.96- 0.96; p <0.001).

	Italians N° (%)	Moroccans N° (%)	Moroccans with Italian citizenship N° (%)	Pv
Infectious Diseases	243.568 (5.35)	1.211 (7.72)	-	**0.000**
	-	1.211 (7.72)	133 (5.82)	**0.001**
	243.568 (5.35)	-	133 (5.82)	0.313
Hospital Admissions	55.578 (22.82)	207 (17.09)	-	**0.000**
	-	207 (17.09)	26 (19.55)	0.478
	55.578 (22.82)	-	26 (19.55)	0.369
Respiratory Infectious Diseases	186.865 (4.10)	913 (5.82)	-	**0.000**
	-	913 (5.82)	79 (3.46)	**0.000**
	186.865 (4.10)	-	79 (3.46)	0.121
Hospital Admissions	43.894 (23.49)	155 (16.98)	.	**0.000**
	-	155 (16.98)	10 (12.66)	0.3231
	43.894 (23.49)	-	10 (12.66)	**0.023**

Table 1

Respiratory infectious diseases

The diagnosis of "Respiratory Infectious Diseases" were a total of 187,857, of which 186,865 for Italians, 913 for Moroccans and 79 for Moroccans with Italian citizenship.

The Chi-square Test showed that there were statistically significant differences in the comparison between Italians and Moroccans (4.1% vs 5.8%, p <0.001), between Moroccans and Moroccans with Italian citizenship (5.8% vs 3.4%, p <0.001) , but not between Italians and Moroccans with Italian citizenship (4.1% vs. 3.4%, p = 0.121) (Table 1).

The Poisson Regression showed that Moroccan nationality (IRR: 1.26; CI 95%: 1.18-1.34, p <0.001), but not the Moroccan origin (IRR: 1.13; CI 95%: 0.90-1.40, p = 0.289), is associated with a greater risk of having assigned a diagnosis belonging to this category.

Moreover, the risk is higher in the male gender (IRR 1.08; CI 95%: 1.07-1.09, p <0.001), while it decreases with increasing age (IRR: 0.96; CI 95%: 0.96-0.96, p <0.001).

The admissions for Respiratory Infectious Diseases were 44,059, of which 43.894 of Italians, 155 of Moroccans and 10 of Moroccans with Italian citizenship.

The Chi-square Test showed statistically significant differences between Italians and Moroccans (23.5% vs. 17%, p <0.001), between Italians and Moroccans with Italian citizenship (23.5% vs. 12.7%, p = 0.023), but not among Moroccans and Moroccans with Italian citizenship (17% vs. 12.7%, p = 0.323) (Table 1).

The Poisson Regression did not show a statistically significant association between Moroccan nationality (IRR: 0.99; CI 95%: 0.84-1.15, p = 0.854) or the Moroccan origin of Italian citizens (IRR: 0.73; 95% CI: 0.39-1.35, p = 0.312) and the risk of hospitalization for respiratory infectious diseases. This risk is greater with age (IRR: 1.02, CI 95%: 1.02-1.02, p <0.001) and with male gender (IRR: 1.10; CI 95%: 1.08-1.12, p <0.001) .

Cardiovascular diseases

The diagnoses of Cardiovascular Diseases were 6.3% for Italians, 1.8% for Moroccans and 2.4% for Moroccans with Italian citizenship (Figure 4).

These data were evaluated using a different statistical method: a descriptive analysis.
Within this ICD-9 category, Italians and Moroccans have been compared with the populations of North Africa (i.e. Algerians, Egyptians, Libyans and Tunisians), which shared geographical proximity and young age, and four diagnostic groups were found: acute and chronic cardiovascular diseases and acute and chronic cerebrovascular diseases. In particular, acute cerebrovascular diseases had a higher rate of diagnosis for all six populations (57.8%), followed by acute (31.4%) and chronic cardiovascular diseases (8.2%) and finally by chronic cerebrovascular diseases (7.6%). Italians had a higher rate of diagnosis of acute cardiovascular diseases (32.4%) than almost all other populations examined (Algerians 25.9% vs Egyptians 42.7% vs Libyans 28.8% vs Moroccans 27.4% vs Tunisians 31.4%).
The same was true for acute cerebrovascular diseases with 57.2% for Italians, 51.8% for Algerians, 44% for Egyptians, 58.6% for Libyans, 52% for Moroccans and 52.9% for the Tunisians. As for chronic diseases, Italians had a lower percentage of diagnosis compared to almost all other populations, both in relation to cardiovascular diseases (Italians 6.6% vs Algerians 11.4% vs Egyptians 7.3% vs Libyans 5.6% vs Moroccans 8.2% vs Tunisian 10.5%) and cerebrovascular diseases (Italians 3.8% vs Algerians 11.1% vs Egyptians 6% vs Libyans 7% vs Moroccans 12.3% vs Tunisians 5.2%) (Figure 5).

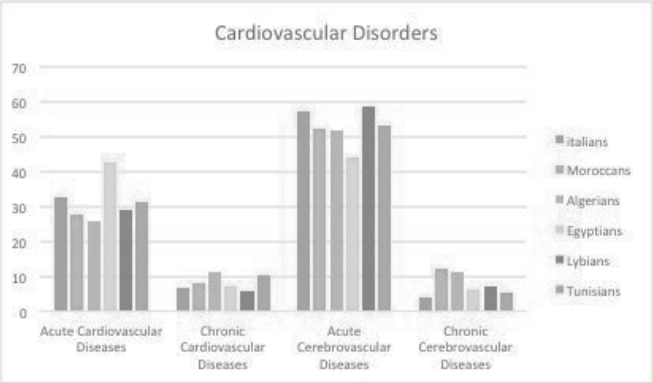

Figure 5

Discussion and conclusion

In the last years, the theme of migration medicine has undergone an evolution that has brought to light chronic pathologies as the main threats to the health status [20, 21, 22]. This would be particularly in accordance with the "Phenomenon of Westernization", in which immigrants would adapt to the lifestyle of the host population, acquiring risky habits and pathologies typical of Western countries, and would go to deny the most classical view of the Medicine of Migration, which sees infectious diseases as the main threat to public health [15, 16, 17, 18, 19]. With such premises, corroborated by the intrinsic risk factors of the Moroccan population, such as hypertension [7, 8], obesity [9, 10, 11] and diabetes [12, 13, 14], one would have expected to find as main causes of access in the Emergency Department, the degenerative diseases, described however, as the main cause of mortality and morbidity of the Moroccan population [23, 24, 25, 26, 27, 28, 29, 30].
In fact, according to our analysis, infectious diseases have shown the main differences between the migrant population and the host population.
The Moroccan population differs from the Italian one for a larger number of diagnoses belonging to ICD-9 codes "Infectious Diseases" and the subgroup "Respiratory Infectious Diseases" mostly.
But considering admissions, we see that Italians are more frequently admitted on the other hand. This could be explained because of a more vulnerability of Italian population to complications, because is older than the Moroccan one, and even because of the improper use of the ED by the host population, usually not enrolled in the National Health Service, and so more frequently and improperly addressed hospitals rather than to general practitioner or other medical services, for diseases that do not require emergency treatment at all. [31]
This would be confirmed by the fact that the Moroccans with Italian citizenship do not differ from the Italians for the diagnosis of Infectious and Respiratory Infectious Diseases, suggesting that they have become homogeneous to the host population (even with Health Care System alignment).
Regarding the degenerative pathologies, the result of our analysis that illustrates the accesses to the ED for "Cardiovascular Diseases" is emblematic: 6.33% of Italians' accesses against 1.81% of Moroccans and 2.36% of Moroccans with Italian citizenship. The main explanation for this difference is, obviously, due to the age: therefore about 60% of Moroccans who have accessed to ED is less than 40 years old.
It is interesting to observe that, within the field of circulatory system diseases, almost all the populations of North Africa, including the Moroccans, had a lower percentage of diagnosis compared to the Italians for acute diseases and instead a greater

percentage for chronic ones, suggesting once again that accesses to the ED by migrant populations often is inappropriate. Italians had a lower percentage of accesses because of chronic diseases, because they could rely on National Health Service. In conclusion, from the perspective of the Emergency Department, Migration Medicine still has infectious diseases as its main topic. Degenerative diseases remain instead the prerogative of Italians while, regarding the Moroccan population, they are more likely to show it up with the aging, because of that "phenomenon of westernization" which is nevertheless not yet apparent.

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Analisi dell'utilizzo del Pronto soccorso da parte della popolazione straniera in cinque grandi ospedali di Roma dal 1998 al 2015

Source: Migliara G., Di Paolo C., Mele A., Paglione L., Prencipe G.P., Salvatori L.M., Marceca M., Bertazzoni G., De Vito C. 2018, Analisi dell'utilizzo del Pronto Soccorso da parte della popolazione straniera in 5 grandi ospedali di roma dal 1998 al 2015. Atti del XV Congresso Nazionale SIMM, Pendragon.

Analisi dell'utilizzo del Pronto soccorso da parte della popolazione straniera in cinque grandi ospedali di Roma dal 1998 al 2015

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Introduzione e obiettivi
Barriere di varia natura possono ostacolare l'accesso e la fruizione dei servizi sanitari e determinarne un utilizzo improprio da parte della popolazione straniera. Obiettivo di questo studio è stato quello di descrivere le caratteristiche degli accessi dei cittadini stranieri ai Pronto Soccorso (PS) di cinque grandi ospedali romani ed evidenziarne le eventuali differenze rispetto ai cittadini italiani.

Metodi/Azioni
I dati sugli accessi ai PS sono stati raccolti dal 1998 al 2015. La popolazione è stata suddivisa in tre gruppi: Italiani, immigrati appartenenti all'Unione Europea (UE), immigrati extra-UE. Successivamente, vista la consistenza della comunità romena nella nostra casistica, si è deciso di analizzare separatamente questa popolazione. Sono state descritte le caratteristiche demografiche degli accessi al PS, i codici triage, le diagnosi e gli esiti per ogni gruppo.

Risultati
Nei 17 anni presi in considerazione, 6.196.032 persone hanno effettuato accesso ai PS degli ospedali inclusi nello studio; di queste, il 7,5% sono risultate extra-UE, il 3,2% Romeni e l'1,5% UE. L'età media è risultata di 42,3 anni per gli Italiani, 36,9 per gli UE, 34,1 per gli extra-UE e 29,6 per i Romeni. Per quanto riguarda i codici triage, si è evidenziata una minore prevalenza nelle popolazioni straniere di codici gialli (UE 13,1%; extra-UE 11,7%, Romeni 9,8%), rispetto agli Italiani (16,3%) accompagnata da una maggiore prevalenza di codici bianchi (UE 14%; extra-UE 16%; Romeni 15,8%), rispetto agli Italiani (12,4%).Gli stranieri hanno ricevuto maggiormente alcune diagnosi. Nello specifico spiccano: "Traumatismi e avvelenamenti" (per i Romeni), "Sintomi, Segni e Stati morbosi mal definiti" (per gli stranieri extra-UE), "Complicazioni della gravidanza, del parto e del puerperio" (per gli stranieri UE ed extra-UE), "Persone che ricorrono ai servizi sanitari in circostanze connesse alla riproduzione e allo sviluppo" (per gli stranieri UE). Infine, gli stranieri sono andati incontro ad un minor numero di ricoveri (UE 15,1%; extra-UE 16,2%; Romeni 15,6%) rispetto al 20,7% degli Italiani e si sono allontanati autonomamente con più frequenza (UE 12,6%; extra-UE 12,1%; Romeni 12,4%) rispetto al 7,4% degli Italiani.

Conclusioni
Il differente pattern di utilizzo del PS da parte dei cittadini stranieri rispetto agli Italiani, specialmente per condizioni non urgenti e che si risolvono con dimissioni a domicilio, suggerisce un utilizzo vicario del PS rispetto ai servizi di cure primarie superiore che per gli Italiani. Inoltre, alcune condizioni sembrano colpire maggiormente gli stranieri rispetto agli Italiani, suggerendo che esistono specifici bisogni di salute per queste popolazioni (fra tutti, le complicanze della gravidanza) che devono essere attentamente valutati al fine di costruire interventi mirati.

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Inappropriatezza, migrazioni e livello di istruzione: una prima valutazione sulle disuguaglianze in tre DEA di Roma

Source: Paglione L., Migliara G., Di Paolo C., Mele A., Prencipe G.P., Salvatori L.M., Bertazzoni G., Villari P., De Vito C., Marceca M., 2018, Inappopriatezza, migrazioni e livello di istruzione: una prima valutazione sulle disuguaglianze in tre DEA di Roma. Atti del XV Congresso Nazionale SIMM, Pendragon.

Inappropriatezza, migrazioni e livello di istruzione: una prima valutazione sulle disuguaglianze in tre DEA di Roma

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Introduzione e obiettivi

L'utilizzo appropriato del Pronto Soccorso (PS) è una delle principali sfide del Servizio Sanitario Nazionale pubblico. Tale esigenza, se da un lato riguarda il corretto funzionamento e la sostenibilità del sistema delle emergenze, dall'altro coinvolge i servizi territoriali e di cure primarie. L'inappropriatezza viene spesso analizzata in relazione alle tipologie di diagnosi piuttosto che attraverso l'analisi dei Determinanti Sociali di Salute. Obiettivo dello studio è indagare eventuali fattori sociali associati con l'inappropriatezza.

Metodi/Azioni

Sono stati utilizzati i dati relativi agli accessi al PS di tre ospedali romani, relativi agli anni 1999-2014. La popolazione (n=2.896.543) è stata suddivisa in 5 gruppi sulla base della nazionalità, secondo la classificazione per reddito della Banca Mondiale, in: paesi a reddito "basso", "medio-basso", "medio-alto", "alto". Gli italiani sono stati analizzati separatamente. All'interno di ciascun gruppo la popolazione è stata suddivisa in cinque classi a seconda del titolo di studio conseguito, da "nessun titolo" a "laurea o superiore". L'inappropriatezza, definita come "codice bianco" al triage seguito da "dimissioni a domicilio", è stata calcolata per ciascun gruppo. È stato quindi calcolato il rischio relativo (RR) per ciascun titolo di studio rispetto a "Nessun titolo" (RR=1).

Risultati

L'inappropriatezza non si distribuisce in maniera uniforme tra i livelli di istruzione. Per quanto riguarda i pazienti da paesi a reddito medio-alto (Licenza Elementare RR=1,1; Diploma scuola media inferiore RR=1,2; Diploma scuola media superiore RR=1,3; Laurea o superiore RR=1,4); ad alto reddito (Licenza Elementare RR=0,9; Diploma di scuola media inferiore RR=1,3; Diploma di scuola media superiore RR=2; Laurea o superiore RR=2) e per gli Italiani (Licenza Elementare RR=1,4; Diploma scuola media inferiore RR=1,8; Diploma scuola media superiore RR=1,9; Laurea o superiore RR=2), gli RR di accesso inappropriato al PS si distribuiscono secondo un gradiente, aumentando con il crescere del titolo di studio. Per coloro i quali provengono da paesi a reddito medio-basso (Licenza Elementare RR=0,5; Diploma scuola media inferiore RR=0,5; Diploma scuola media superiore RR=0,5; Laurea o superiore RR=0,4) o basso reddito (Licenza Elementare RR=0,7; Diploma scuola media inferiore RR=0,7; Diploma scuola media superiore RR=0,6; Laurea o superiore RR=0,7), si nota invece una associazione tra titolo di studio più alto e utilizzo più appropriato del PS.

Conclusioni

I risultati suggeriscono come, per gli stranieri, il titolo di studio non sia un predittore efficace di utilizzo appropriato del PS nel caso in cui la persona provenga da paesi a reddito basso o medio-basso. È necessario esplorare, come indicato in letteratura, il legame tra titolo di studio e posizione socioeconomica, in particolare lavorativa, direttamente correlata con il tempo a disposizione per l'utilizzo corretto dei servizi.

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Accesso delle donne straniere per complicanze della gravidanza al Pronto Soccorso di 5 Ospedali Romani, 1999-2014

Source: Salvatori L.M., Migliara G., Di Paolo C., Mele A., Paglione L., Prencipe G.P., De Vito C., Marceca M., 2018, Accesso delle donne straniere per complicanze della gravidanza al pronto soccorso di 5 ospedali romani 1999-2014. Atti del XV Congresso Nazionale SIMM, Pendragon.

Accesso delle donne straniere per complicanze della gravidanza al Pronto Soccorso di 5 Ospedali Romani, 1999-2014

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Introduzione e obiettivi
Come ampiamente riportato in letteratura scientifica, le Complicanze della Gravidanza, del Parto e del Puerperio (CGPP), comprese le Gravidanze con Esito Abortivo (GEA), sono un problema rilevante per le donne appartenenti a minoranze etniche e in condizioni di svantaggio socio-economico. Lo scopo di questo studio è stato quello di indagare le caratteristiche degli accessi in Pronto Soccorso (PS) delle donne italiane e straniere per CGPP e GEA e valutarne eventuali differenze.

Metodi/Azioni
I dati sugli accessi in PS di cinque grandi ospedali di Roma sono stati raccolti dal 1999 al 2014. La popolazione femminile è stata divisa in 23 gruppi sulla base della nazionalità (Gruppi di Popolazione, GP); questo raggruppamento è stato effettuato seguendo il metodo di utilizzato a fini statistici dalle Nazioni Unite, fatta esclusione per le Italiane, le Romene (la popolazione straniera più numerosa a Roma) e le apolidi, che sono state considerate separatamente. La regressione di Poisson è stata utilizzata per valutare il rischio di accesso al PS per Complicanze della Gravidanza, del Parto e del Puerperio (ICD9-CM 630-677), escludendo i parti normali (ICD9 650.0-651.2), e per Gravidanze con Esito Abortivo (ICD9-CM 634-639) per ogni gruppo rispetto alle italiane.

Risultati
Nei 15 anni presi in considerazione hanno effettuato accesso ai PS dei cinque ospedali di Roma 2.668.537 donne, delle quali il 7.3% ha ricevuto una diagnosi di CGPP. In particolare, 13.078 hanno ricevuto diagnosi di gravidanza con esito abortivo (corrispondente allo 0,5% delle donne totali e al 6,8% delle donne con diagnosi di CGPP).I GP con una percentuale più alta di diagnosi di CGPP sono stati: Asia Meridionale (22,4%), Asia Orientale (19,5%) e Asia Sud-Orientale (16,4%), rispetto al 6,5% delle Italiane; i GP con una percentuale più alta di diagnosi di GEA sono stati: Asia Sud-Orientale (1,72%), Africa Occidentale (1,7%) e Asia Orientale (1,3%), rispetto allo 0,4% delle Italiane.Alla regressione di Poisson tutti i gruppi hanno evidenziato un rischio significativamente aumentato di diagnosi di CGPP rispetto alle Italiane, con l'eccezione dell'Africa Meridionale, dell'America Settentrionale e dell'Australia e Nuova Zelanda. Anche l'analisi dei GEA ha evidenziato che la maggior parte dei GP mostra un rischio aumentato rispetto alle Italiane, con l'eccezione dei GP sopracitati e dell'Africa Centrale e dell'Asia Centrale.

Conclusioni
L'aumentato rischio di diagnosi di CGPP e di GEA in tutti i gruppi rispetto alle Italiane, fatta esclusione di quelli probabilmente composti soprattutto da turiste e di quelli troppo poco rappresentati nella casistica, suggerisce la necessità di interventi mirati a favorire l'accessibilità e la fruibilità dei servizi territoriali di cure prenatali da parte delle donne straniere.

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a cura di Giuliano Bertazzoni, Corrado De Vito, Silvia Iorio, Armando Montanari

This study, which brings together and consolidates the research work of the interdisciplinary EMHAM group, is focused on the relationship among human mobility, healthcare and fairness in public healthcare and treatment.
The investigation of the information produced by the Emergency Departments of the Rome Metropolitan Area has proved to be strategic in identifying the healthcare needs of foreign populations. Many of the dynamics concerning migrants can be traced back to the inappropriateness of visits and accesses to the Emergency Departments. This information, together with the result of dynamic evaluations and assessments, is useful not only for healthcare issues, but also for the demographic, socio-political and economic characterisation of the phenomenon of human mobility.

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