

# Information network and data base in clinical diagnosis and bacterial sensibility surveillance – a special requirement in acute diarrhoea control and monitoring into a regional area

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*Abstract:* Worldwide acute diarrhoea constitutes a major cause of morbidity and mortality. Acute diarrhoea is usually caused by infection, with viruses, bacteria, parasites. Bacteria involved in acute diarrhoea may be detected by culture from the stool of ill person. For a correct and quick treatment of patients with acute diarrhoea, is very useful, to investigate the resistance/susceptibility to antibiotics of the pathogen bacteria isolates. Testing the susceptibility to antibiotics needs time (2-3 days) and can delay the beginning of the treatment. The aim of our work was to argue, based on medical evidences, the necessity of establishment of a unique electronic medical data base, containing daily updated information about the resistance to antibiotics of pathogen germs, isolated from patients with acute diarrhoea. All medical services (hospitals, polyclinics, laboratories) involved in etiological diagnosis of the diarrhoea will permanent fill in medical information into data base. The information could be permanently accessed through networks by all users being specialists in different medical fields.

*Key Words:* acute diarrhoea, information network, data base

## 1. Introduction

Acute diarrhoea is defined as the abrupt onset of abnormally high fluid content in the stool, more than normal value. This situation implies a greater number of stools, which can range from 4-5 to more than 20 times per day [7, 19].

Worldwide acute diarrhoea constitutes a major cause of morbidity and mortality, especially among the children, older people and high-risk patients (immuno-compromised). [4, 19]. It is estimated that each year adults from United States experience 99 million episodes of acute diarrhoea, resulting in about 8 million physician visits and more than 250.000 hospital admissions [19]. In developing countries an average of 3 episodes per child per year in children younger than 5 years is reported; some areas report 6-8 episodes [7]. Acute diarrhoea disease is the second leading cause of death in children under 5 years old. Globally there are about 2 billion cases of diarrhoea disease every year [2].

Acute diarrhoea is usually caused by infection, with viruses (rotavirus, calicivirus, astrovirus, entericivirus), bacteria (*Campylobacter jejuni*, *Salmonella*, *E. coli*, *Shigella*, *Yersinia enterocolitica*), parasites [7, 8].

Diarrhoea may be mild or severe. The most common complications of acute diarrhoea are dehydration and electrolyte imbalances, principal causes of morbidity and mortality [5, 7]. *E.coli*, *Salmonella*, *Shigella*, *Campylobacter jejuni*, *Yersinis* may be detected by isolation from the faeces of ill persons, before treatment

with antimicrobials [14]. Performance of routine culture is critical for antibiotics resistance testing [19].

Antimicrobial therapy is indicated for nonviral diarrhoea, in traveler's diarrhoea, shigellosis, campylobacteriosis and in invasive clinical forms [7, 16]. In choosing the appropriate antimicrobial agent for therapy the susceptibility to antibiotics of infecting organism must be known [11]. Treatment recommendations need to be updated frequently as antibiotic resistance emerges [16]. Testing the susceptibility to antibiotics needs time (2-3 days) and can delay the beginning of the treatment [3, 12].

Antibiotic resistance is the type of drug resistance where a micro-organism is able to survive to exposure to an antibiotic. The widespread use of antibiotics both inside and outside of medicine is playing a significant role in the emergence of resistant bacteria. Some of resistant bacteria in animals are transmitted to humans, via meat or other food of animal origin or through direct contact with farm animals [20]. The emergence of multidrug- resistant *Salmonella* is probably related to agricultural uses of antimicrobials [14]. Antibiotic resistance is a growing problem for enterical bacterial pathogens. Because bacteria involved in acute diarrhoea (*Campylobacter*, *Salmonella*, *Shigella*, *Yersinia*) are increasingly resistant to multiple antibiotics the practitioner must be familiar with the local resistance pattern of bacteria to treat appropriately the disease [6, 10]. *Salmonella gastroenteritis* is usually a self-limited

disease. Antimicrobial therapy is indicated for patients that are at increase risk for invasive disease (neonates, older than 50 years, persons with immuno-suppressions [10]. Multidrug resistance among human non-typhoidal Salmonella isolates is increasing in both developing and developed countries [18].

**2. Aim**

The aim of our work was to argue, based on medical evidences, the necessity of establishment of a unique electronic medical data base, containing daily updated information about the resistance to antibiotics of pathogen germs, isolated from patients with acute diarrhoea.

**3. Subjects and methods:**

A retrospective study (on various epidemiological aspects) was developed in Infectious Diseases County Hospital of Brasov, on cases admitted in hospital with acute diarrhoea, during 2005-2009. Also we have studied the response to antimicrobial agents of Salmonella strains isolated from faecal samples of patients with acute diarrhoea during 1997-2001 and 2004-2005.

**4. Results:**

In the last 5 years a lot of cases of acute diarrhoea were registered in Brasov and acquired admission into the hospital and special assistance and medical care (fig. 1):

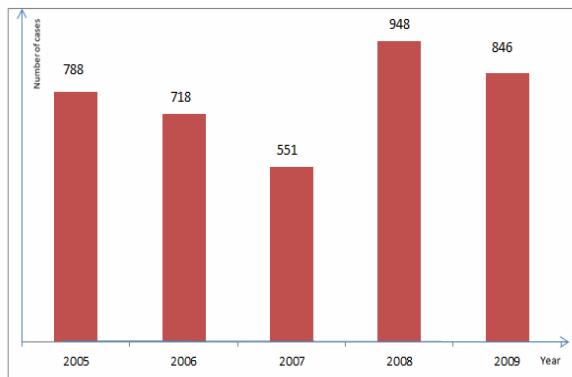


Figure 1 – Yearly distribution of admission for acute diarrhoea in Infectious Diseases Hospital of Brasov during 2005-2009

Brasov study diagnosed acute diarrhoea in both men and women and all ages (adults and children), in county side as well as town area (fig.2, 3, 4):

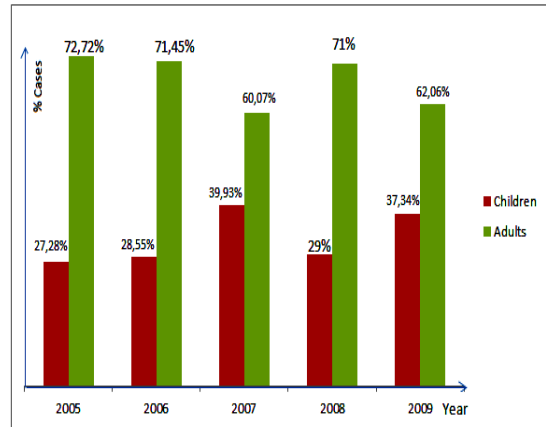


Figure 2 – Yearly frequency of hospitalizations for acute diarrhoea depending on age of the patients ( Infectios Diseases Hospital of Brasov during 2005-2009)

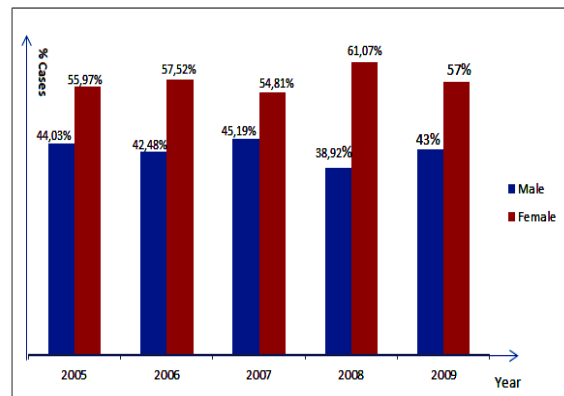


Figure 3 – Yearly frequency of hospitalization for acute diarrhoea depending on sex of the patients ( Infectios Diseases Hospital of Brasov 2005-2009)

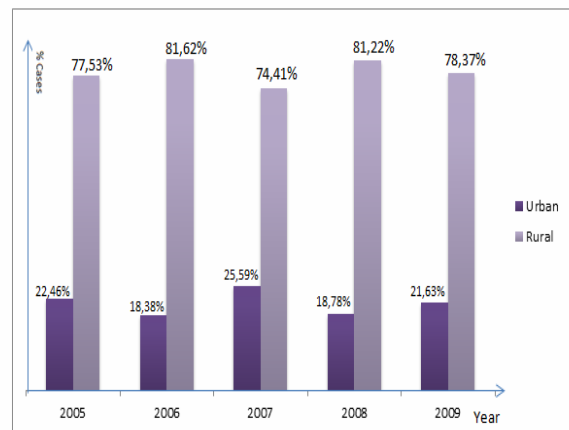


Figure 4 – Yearly frequency of hospitalizations for acute diarrhoea depending on origin of the patients ( Infectios Diseases Hospital of Brasov 2005-2009)

The comparative study of antibiotic susceptibility of Salmonella isolates from patients hospitalized for acute diarrhoea between the two periods, (1997-2001 and 2004-2005) shows important changes, increases and decreases of resistance/susceptibility to the same drug (tab. I, II, III):

Table I – Susceptibility to antibiotics of Salmonella spp. Isolates during 1997-2001

(Infectious Diseases Hospital of Brasov)

Antibiotic	Number of tested isolates	Susceptibility (number - %)	Drug-resistance (number - %)
CIPROFLOXACIN	54	53 – 98%	1 – 2%
NALIDIXIC ACID	56	33 – 59%	23 – 41%
SULFAMETHOXAZOL	37	23 – 62%	14 – 38%
TETRACYCLINE	52	22 – 42%	30 – 58%
AMPICILLIN/AMOXICILLIN	58	36 – 42%	22 – 38%

Table II – Susceptibility to antibiotics of salmonella spp. isolates during 2004-2005

(Infectious Diseases Hospital of Brasov)

Antibiotic	Number of tested isolates	Susceptibility (number - %)	Drug-resistance (number - %)
CIPROFLOXACIN	41	40 – 97,56%	1 – 2,43%
NAUDIXIC ACID	41	17 – 41,46%	24 – 58,53%
SULFAMETHOXAZOL	42	37 – 88,09%	5 – 11,9%
TETRACYCLINE	32	26 – 81,25%	6 – 18,75%
AMPICILLIN/AMOXICILLIN	29	23 – 79,31%	6 – 20,68%

Table 3 – Dynamics of resistance to antibiotics of Salmonella spp. during 1997-2001 and 2004-2005

(Infectious Diseases Hospital Brasov)

Antibiotic	Drug-resistance 1997 - 2001	Drug-resistance 2004 - 2005	Observations
CIPROFLOXACIN	2%	2,43%	Stationary
NALIDIXIC ACID	41%	58,53%	Increase
SULFAMETHOXAZOL	38%	11,9%	Decrease
TETRACYCLINE	58%	18,75%	Decrease
AMPICILLIN/AMOXICILLIN	38%	20,68%	Decrease

Medical literature reports numerous studies which mention existence and extent the antibiotic resistance of Salmonella non-typhoidic isolates. In United States, studies made between 1999-2004 and 2003-2007 showed emergence of multidrug-resistant non-Typhi Salmonella strains [15, 17]. Another study, accomplished in Morocco, conclusions the necessity of control antibiotic resistance in Salmonella to avoid the spread of multidrug resistance [2]. In Austria the resistance of Salmonella isolates is still low to some antibiotics (like cipro-floxacin), mentioned also in our study [8].

In this context is necessary to consider establishing a unique electronic medical data base, containing daily updated information about the sensibility and resistance of pathogen germ isolates to antibiotics, bacteria causing acute diarrhoea in a specific geographic area. All medical services (hospitals, policlinics, laboratories) involved in etiological diagnosis of the diarrhoea will permanent fill in medical information into data base. The information could be permanently accessed through networks by all users being specialists in different medical fields. The specific purpose is to apply the correct treatment to all patients into the regional area, just in time. Also, we consider this data base as very useful in the epidemiological surveillance of bacteria (designing a map of circulation and sensibility to antibiotics) (fig.5, 6):

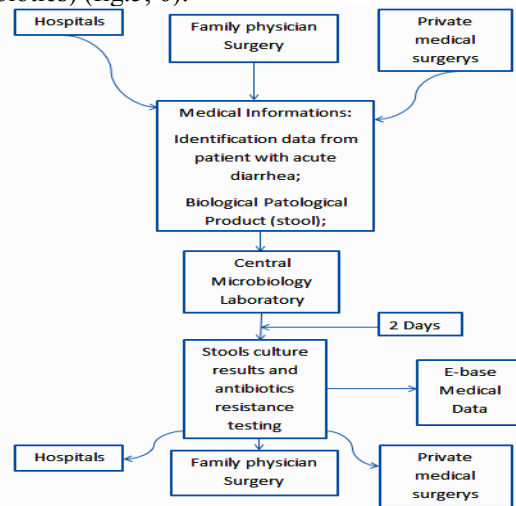


Figure 5 – Common route from patient to appropriate treatment

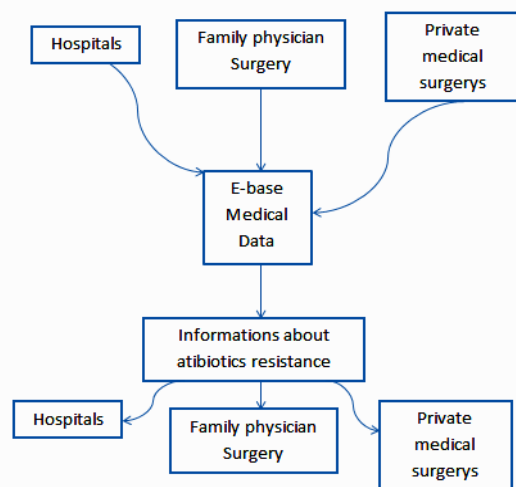


Figure 6 – Propouse route from patient to appropriate treatment

## 5. Conclusion

In conclusions, we consider that establishing an electronic unique data base with complete information regarding the circulation of bacterial stems producing acute diarrhoea and their continuous changing of sensibility to antibiotics will bring an obvious improvement to medical activity's quality and will allow a rapid and correct therapeutic decision. In the same time using the data base will permit a rigorous epidemiological surveillance of the territory and to decide efficient measure to control and to fight against possible illnesses produced by bacteria enfold into data base.

This databases must respect ethical rules and is a modality for developing e-Health in Romania [1, 13]

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