Dariusz Nowicki[1], Lucyna Gajewska[1], Krystyn Andrzej Sosada[2]

MEASLES OUTBREAK REGISTERED BY THE DISTRICT SANITARY – EPIDEMIOLOGICAL STATION IN CZĘSTOCHOWA IN 2013

[1]District Sanitary – Epidemiological Station in Częstochowa
[2]Medical University of Silesia in Katowice, Department of General and Bariatric Surgery and Emergency Medicine in Zabrze

ABSTRACT

INTRODUCTION. Since 2001, Poland has been committed to measles elimination programme coordinated by the World Health Organization. This programme is intended to sustain 95% coverage with measles vaccines and ensure laboratory confirmation of suspected measles cases. In 2013, a total of 89 measles cases were reported in Poland. Of them, 14 cases were notified to the District Sanitary-Epidemiological Station (DSES) in Częstochowa.
PURPOSE. The purpose of this study was to evaluate the epidemiological situation of measles in Częstochowa with focus on the increase in measles incidence observed in the second quarter of 2013.
MATERIAL AND METHODS. To analyze the epidemiological situation of measles, the reports on the cases of infectious diseases and poisonings in Poland in 2000-2013 (MZ-56) from the National Institute of Public Health-National Institute of Hygiene (NIPH–NIH) and Częstochowa DSES were employed. The analysis of immunization coverage of children and adolescents in selected year groups in 2009-2012 was performed using the data retrieved from annual reports issued by Częstochowa DSES (MZ-54).
RESULTS. In 2000-2012, three cases of measles were notified to Częstochowa DSES. Of them, two cases and one case were reported in 2003 and 2011, respectively. In 2013, an increase in the number of measles cases and measles incidence was observed. A total of 14 adult cases, aged 22-38 years, were reported and the incidence was 3.78 per 100,000. Of them, 13 cases were males (93% of the total). The infection affected 8 inmates of the Day Care Centre in Częstochowa, 2 individuals who lived near this institution and 4 individuals who were not epidemiologically linked to the outbreak. Of the cases, 12 individuals were hospitalized, i.e. 86% of all cases. Of 14 reported cases, only one individual had a history of measles vaccination.
CONCLUSIONS. Measles remains a highly infectious disease which can be easily transmitted in the unvaccinated population.

Keywords: *measles, epidemiological situation, vaccination*

INTRODUCTION

Measles is an acute infectious disease which is caused by an RNA virus of the genus *Morbillivirus* within the *Paramyxoviridae* family. Measles is accompanied by high fever, inflammation of the mucosa and skin rash. A person infected with measles virus is infectious from 5 days prior until 3 days following rash onset. The disease is transmitted by respiratory, airborne route and direct contact with the infected person. The majority of cases occur in children younger than 15 years of age. Irrespective of the age, each person may be susceptible to infection provided he has not a history of contracting measles or has not been vaccinated. Infants under the age of 6 months are protected against measles if their mothers have had measles in the past or have been immunized against measles. It is estimated that 95% of infants of mothers who have contracted measles or with vaccine-induced immunity lose passively acquired antibodies at the age of 11-12 and 8 months, respectively (1).

Complications from measles are reported frequently. The most common complications include pneumonia, bronchitis, otitis media and laryngitis. Pneumonia is usually of severe course. It requires hospitalization and may be a life-threatening condition,

especially in emaciated persons with congenital heart defects. Encephalitis may also appear as the complication of measles. It occurs in 1 out of 4 cases per 1,000 persons who develop measles. The risk of neurological complications increases with age, i.e. in persons aged > 10 years it is 2-3 times higher. Subacute sclerosing panencephalitis (SSPE) is a specific complication of measles which may be present several months to years after measles infection, 5 to 7 years on average. Gastrointestinal complications include diarrhoea, appendicitis and hepatitis (1).

Laboratory criteria for measles diagnosis confirmation include detection of measles-specific IgM antibodies in persons who were not vaccinated lately, i.e. at least 8 weeks prior to the onset of symptoms or at least 4-fold increase in IgG antibody titres or isolation of measles virus from a clinical specimen (1).

In the differential diagnosis of measles, the diseases accompanying by rash, especially rubella, scarlet fever, three-day fever, enteroviral and adenoviral infections with rash, allergic skin reactions should be considered.

Vaccination is of the highest significance in the prevention of measles. In Poland, the vaccination against measles was introduced to the mandatory immunization programme in 1975 when a single dose of monovalent vaccine was administered. In 1991, due to the occurrence of infections in persons older than 5 years, the second dose of monovalent vaccine against measles was introduced, initially at the age of 9 years and subsequently at the age of 7 years. A successive measure in the prevention of measles consisted in the introduction of recommended combined vaccine against measles, mumps and rubella to the Polish Immunization Programme (PIP) in 1994. In 2004, MMR vaccine was introduced to the mandatory immunization programme. Initially, the first dose of combined vaccine was administered at the age of 13-15 months. Since 2005, a booster dose of vaccine was administered. Pursuant to the current PIP, the first and second doses of combined vaccine against measles, mumps and rubella are administered at the age of 13-15 months and 10 years, respectively (4,6,7).

Having considered the features of measles, it may be considered for elimination and eradication, i.e. human is the only reservoir for the measles virus, post-infection carriage of measles virus is not observed, the virus does not circulate in the environment and there is an effective preventive measure in the form of safe vaccine against measles.

World Health Organization within the framework of measles elimination strategy recommends to register and report on all suspected cases of measles and to confirm each suspected case of measles by laboratory testing. The confirmatory testing consists in the detection of measles-specific IgM antibodies in serum of measles case. This testing is performed in the laboratories nominated by WHO. In Poland, the National WHO Measles/Rubella Laboratory is situated in the Department of Virology of the National Institute of Public Health – National Institute of Hygiene in Warsaw (2,3).

The objective of the present paper is to analyze the epidemiological situation of measles on the territory within the jurisdiction of the District Sanitary – Epidemiological Station in Częstochowa with focus on the significant increase in the measles incidence in the second quarter of 2013. The number of measles cases and measles incidence for Poland and the area under the jurisdiction of DSES in Częstochowa in 2000-2013 as well as the immunization coverage of children aged 0-13 years against measles, mumps and rubella in 2009-2012 were evaluated.

MATERIAL AND METHODS

To analyze the epidemiological situation of measles in Poland in 2000-2013, the data from annual reports of the National Institute of Public Health-National Institute of Hygiene in Warsaw were employed. The epidemiological situation of measles in DSES in Częstochowa in the same period was evaluated based on the reports on the cases of infectious diseases and poisonings in Poland in 2000-2013 (MZ-56). The immunization coverage of children and adolescents in selected year groups in 2009-2012 was analyzed using data retrieved from annual reports issued by Częstochowa DSES (MZ-54).

RESULTS AND INTERPRETATION

In Poland, prior to the introduction of vaccination against measles in the 1960s, measles incidence was 300-400 cases per 100,000 inhabitants. Having introduced mandatory immunization, the incidence was gradually decreasing. In 2004-2005, the incidence rate amounted to 0.03 per 100,000 inhabitants (5). Unvaccinated persons or those who have received only single dose of vaccine were most commonly affected.

Table I presents the number of measles cases and incidence rate in Poland and DSES in Częstochowa in 2000-2013. In the territory of DSES in Częstochowa, only 3 measles cases were reported in 2000-2012, including 2 cases notified in 2003 and one case in 2011. A significant increase in the number of measles cases was observed in the second quarter of 2013 when the DSES in Częstochowa was notified of 20 suspected cases of measles aged 11-38 years. The serologic testing for measles was performed in all cases. The testing confirmed the diagnosis of measles in 14 cases, the remaining six test results were negative, excluding measles infection.

The infections confirmed by laboratory testing occurred in adults aged 22-38 years. Of them, males were mostly affected, i.e. 13 males and 1 female. The incidence rate was assessed at 3.78 per 100,000 inhabitants.

Table I. Number of cases and incidence rate of measles in Poland, in the Silesian province and in the Częstochowa DSES in 2000-2013.

Year	Number of cases			Incidence rate		
	Poland	Province	DSES	Poland	Province	DSES
2000	77	21	0	0.20	0.43	0
2001	133	26	0	0.34	0.54	0
2002	34	5	0	0.09	0.11	0
2003	48	4	2	0.13	0.08	0.53
2004	11	3	0	0.03	0.06	0
2005	13	6	0	0.03	0.13	0
2006	120	8	0	0.31	0.17	0
2007	40	8	0	0.10	0.17	0
2008	100	36	0	0.26	0.77	0
2009	115	5	0	0.30	0.11	0
2010	13	1	0	0.04	0.02	0
2011	38	2	1	0.10	0.04	0.26
2012	70	22	0	0.18	0.48	0
2013	88	30	14	0.23	0.65	3.78

The first infections occurred at the beginning of April in persons participating in activities organized by the Day Care Centre for Mentally Retarded People in Częstochowa. Due to the telephone calls received from the employers of this institution and parents of inmates who informed on atypical infections accompanied by rash and hospitalization of two persons on the infectious diseases ward of the Provincial Specialist Hospital in Częstochowa, epidemiological investigation was initiated to verify these notifications. From the investigation transpired that 5 persons participating in the activities of the Day Care Centre in Czętochowa were hospitalized on April 10, 2013. The first hospitalization was dated on April, 02 (a case with rash was notified – ICD-10: R21). The next hospitalization was reported on April, 05 (suspected case of rubella). On April 06, 2013 two persons were admitted to hospital, of whom one patient was suspected of rubella and the second one of scarlet fever. Having considered ingoing notifications and initial results of epidemiological analysis, State District Sanitary Inspector on April 10, 2013 contacted the head of the infectious diseases ward and informed him on the occurrence of infections in Silesian province. It was decided that the notifications on cases suspected of measles would be sent. Furthermore, it was stated that each blood sample collected from patients would be tested for measles out of charge within the epidemiological surveillance. On April 11, 2013, notifications on 6 suspected cases of measles were sent to DSES in Częstochowa from the infectious diseases ward of the Provincial Specialist Hospital in Częstochowa, PCK 7 street. The blood samples collected from patients were transported to the laboratory of PSES in Katowice. Then, these samples were delivered to the Department of Virology of the National Institute of Public Health – National Institute of Hygiene in Warsaw.

The diagnosed patients presented the following symptoms: fever over 38 °C lasting for 5 days and longer, cough, sore throat, conjunctivitis and generalized maculopapular rash. In case of one patient, single blisters filled with serous fluid appeared. Four patients were diagnosed with pneumonia resulting from measles.

From the epidemiological data obtained by interviewing the employers of the Day Care Centre in Czestochowa transpired that 39 persons attend this Centre under the decision of Social Welfare Centre in Częstochowa. It was recommended that the personnel of this Centre should inform the carers on the infections occurred and offer them temporal isolation in house settings or visiting the doctor provided the symptoms would appear. It was also determined that 5 pensioners were treated in out-patient clinic. They were suspected of erythema infectiosum, chicken pox, scarlet fever, allergy. General practitioners did not suspect measles in these patients.

Overall, 9 persons attending the Day Care Centre in Częstochowa were hospitalized in the infectious diseases ward of the Provincial Specialist Hospital in Częstochowa. In case of first and last patient, the onset of symptoms occurred on March 29, 2013 and April 14, 2013, respectively. The serologic testing for the presence of measles-specific IgM antibodies performed in the PSES laboratory in Katowice and the Department of Virology in the National Institute of Public Health-National Institute of Hygiene confirmed the diagnosis of measles in 8 persons. The hospitalization of measles cases ranged from 8 to 16 days. In 6 persons, pneumonia was diagnosed as a complication of measles. All patients have not been vaccinated against measles due to neurological contraindications (congenital neurological defects, Down's syndrome).

Besides the outbreak reported, scattered infections also occurred in 6 persons. Of them, two cases were epidemiologically linked to this outbreak (male and his partner living on Focha street near the Day Care Centre in Częstochowa). These infections occurred between April 13, 2013 and May 26, 2013. Laboratory testing confirmed measles diagnosis in all cases, i.e. serologic testing revealed the presence of measles-specific IgM antibodies in 5 persons and virological testing confirmed the presence of measles virus particles in clinical specimen collected from 1 person (urine). The hospitalization of four persons ranged from 5 to 8 days. All patients were diagnosed with pneumonia resulting from mealses. Only one person was vaccinated against measles. This person received one dose of monovalent vaccine (age at

Table II Overview of the epidemiological investigation of measles cases in 2013 in the Czestochowa DSES.

No.	Gender	Age	Onset of symptoms	Initial diagnosis	Hospital-ization	Compli-cation	Vaccina-tion against measles	Laboratory testing	Travelling abroad
Outbreak (pensioners of DCC)									
1.	M	24	March 30	Rash	April 02-17	Pneumonia	None*	Blood IgM+	-
2.	M	27	March 29	Suspicion of rubella	April 05-18	Pneumonia	None*	Blood IgM+	-
3.	M	28	April 02	Suspicion of rubella	April 06-17	Pneumonia	None*	Blood IgM+	-
4.	M	25	April 04	Suspicion of scarlet fever	April 06-17	Pneumonia	None*	Blood IgM+	-
5.	M	22	April 05	Suspicion of measles	April 10-17	-	None*	Blood IgM+	-
6.	M	32	April 08	Suspicion of measles	April 10-18	-	None*	Blood IgM+	-
7.	M	27	April 13	Suspicion of measles	April 17-25	Pneumonia	None*	Blood IgM+	-
8.	M	25	April 14	Suspicion of measles	April 18-25	Pneumonia	None*	Blood IgM+	-
Remaining cases									
9.	M	38	April 13	Suspicion of mononucleosis	April 20-26	Pneumonia	N.A.	Blood IgM+	-
10.	M	37	April 17	Suspicion of measles	April 19-26	Pneumonia	N.A.	Blood IgM+	-
11.	M	29	April 28	Suspicion of measles	Outpatient treatment	-	None*	Blood IgM+	-
12.	M	27	April 30	Suspicion of measles	May 05-10	Pneumonia	N.A.	Blood IgM+	April 22 coming back from Sweden
13.	M	36	May 11	Suspicion of measles	May 14-21	Pneumonia	N.A.	urine-presence of virus particles	-
14.	F	24	May 26	Measles	Outpatient treatment	-	I dose - 1980	Blood IgM+	-

Legend: M-male, F-female, DCC- Day Care Centre ,
*contraindications to vaccination

the time of infection-24 years). In 4 persons aged 28-38, there was a lack of documentation concerning vaccination. In case of one patient aged 29 years, information on contraindication to vaccination due to past measles infection at the age of 3 months (1984) was included in vaccination documentation. Information obtained from epidemiological investigation was summarized in table II.

Based on the data collected, the source of reported outbreak was not determined. It should be considered whether rare infectious diseases raise proper epidemiological and diagnostic vigilance in physicians. The observation of DSES in Częstochowa resulting from investigation of measles outbreak reported in 2013 suggests that only the occurrence of higher number of infections and verification of notifications contributed to the improvement of diagnostics for measles and objective assessment of epidemiological situation.

In 2009-2012, on the territory of DSES in Częstochowa, a high coverage with mandatory vaccines against measles, mumps and rubella was noted (Tab. III). Based on the reports (MZ-54) issued in 2012, vaccination coverage of children in age groups 2010-2004 ranged from 97.48% to 99.46%. A total of 79.5% children were vaccinated at the age of 2 years. The coverage with booster dose in year groups 2000-2003 ranged from 40.11% to 77.7%.

The analysis of epidemiological situation of measles in the territory of DSES in Częstochowa with a special focus on the outbreak reported in the second quarter of 2013 suggests that the measles may be transmitted in the population of unvaccinated persons. It would be advisable to perform interim vaccination in population of unvaccinated persons attending such centres as the one in Częstochowa.

Furthermore, it should be stated that the sensitivity of measles surveillance is not sufficient enough.

Table III. Number and percentage of children vaccinated against measles in the Częstochowa DSES including the year of birth (born in 2004-2012 and 2000-2003) – based on MZ-54

Year group	Years							
	2009		2010		2011		2012	
	Number of children	%	Number of children	%	Number of children	%	Number of children	%
I dose								
2012	x	x	X	X	x	x	3071	X
2011	x	x	X	X	x	x	3277	79.6
2010	x	x	X	X	3511	79.3	3487	97.5
2009	x	x	3602	82.3	3595	97.0	3590	98.4
2008	3536	80.1	3506	97.7	3475	98.6	3490	99.0
2007	3267	98.5	3257	99.1	3264	99.2	3227	99.4
2006	3088	99.0	3077	99.3	3041	99.5	3030	99.5
2005	3082	99.3	3050	99.4	3040	99.4	3021	99.5
2004	2982	99.2	2974	99.3	2965	99.4	2946	99.5
Booster dose								
2003	3031	X	3018	0.2	3002	X	2982	77.7
2002	2938	0.1	2940	0.2	2908	48.5	2891	55.9
2001	3079	0.2	3065	40.2	3045	48.2	3033	48.8
2000	3171	32.1	3156	39.1	3148	39.3	3141	40.1

Irrespective of the current information on the epidemiological situation of measles delivered in writing to the healthcare units and information on WHO measles elimination programme (9) which specifies the necessity of laboratory confirmation of all cases suspected of measles, it is still an infectious disease which physicians rarely suspect in patients with fever and rash. The evidence constitutes the diagnoses of the patients admitted to infectious diseases ward who were finally confirmed by laboratory testing as measles cases.

SUMMARY AND CONCLUSIONS

1. Measles is still a serious infectious disease which is transmitted in the unvaccinated population.
2. A significant increase in the number of measles cases was reported in the DSES in Częstochowa in 2013.
3. In 2009-2012, a high coverage of children with measles, mumps and rubella vaccine in DSES in Częstochowa was reported.

REFERENCES

1. Magdzik W, Naruszewicz-Lesiuk D, Zieliński A. Choroby zakaźne i pasożytnicze-epidemiologia i profilaktyka, Bielsko-Biała; wydawnictwo α-medica press,2007:204-209.
2. Makówka A, Gut W, Litwińska B. podstawy eliminacji odry na świecie i w Polsce, Przegl Epidemiol 2007;61:135-142.
3. Eliminacja odry/różyczki – program WHO- realizacja w Polsce- zasady- instrukcje; http://www.pzh.gov.pl/page/index.php?id=1081.
4. Program Szczepień Ochronnych na 2013 rok (Dz. Urz. MZ z 2012 poz. 78).
5. Narodowy Instytut Zdrowia Publicznego - Państwowy Zakład Higieny: Choroby zakaźne i zatrucia w Polsce; Biuletyny roczne; http://www.pzh.gov.pl/oldpage/epimeld.
6. Mrożek-Budzyn D. Wakcynologia praktyczna, Bielsko-Biała; wydawnictwo α-medica Press, wyd 3, 2012, 153-158.
7. Magdzik W, Naruszewicz-Lesiuk D, Zieliński A. Wakcynologia, Bielsko-Biała; wydawnictwo α-medica press,2007:412-419.
8. Karasek E, Paradowska-Stankiewicz J. Measles in Poland in 2011. Przegl Epidemiol 2013;67:181-184;307-309.
9. Pasławska A, Mrożek-Budzyn D. Czy rok 2015 jest realnym terminem osiągnięcia eliminacji odry w Europejskim Regionie WHO. Przegl Epidemiol 2013;67:451.

Received: 14.01.2014
Accepted for publication: 21.06.2014

Address for correspondence:
Dariusz Nowicki, M.D.
District Sanitary-Epdemiological Station in Częstochowa
Jasnogórska 15A Street, 42-200 Częstochowa
e-mail : nowicki.dariusz@onet.pl
Tel. (34) 344-99-00