

Diabetic blindness significantly reduced in the Warmia and Mazury Region of Poland: Saint Vincent Declaration targets achieved

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PURPOSE. *The authors' aim was to verify if the targets of the Saint Vincent Declaration concerning the reduction of diabetes-related blindness in the Warmia and Mazury Region, Poland, had been achieved.*

METHODS. *A register of World Health Organization-defined blindness due to diabetes was conducted in the Warmia and Mazury Region between 1989 and 2004. The incidence rate of blindness as the number of new cases/100,000 diabetic population/year and 100,000 total population/year was estimated for three subperiods differing in political-economic system and diabetologic care delivery: 1989–1994, 1995–1999, and 2000–2004.*

RESULTS. *The major cause of blindness among diabetic patients was diabetic eye disease (97%). Out of 70 patients with Type 1 diabetes, 53% lost vision due to proliferative diabetologic vitreoretinopathy, 20% due to neovascularization with glaucoma, while clinically significant macula edema and cataract associated with proliferative diabetologic vitreoretinopathy or clinically significant macula edema predominated in 210 patients with Type 2 diabetes. The incidence rate of blindness due to diabetes in the diabetic population ranged from 102.4/100,000 (confidence interval [CI]: 65.7–139.0) to 13.3/100,000 (3.8–24.9). The incidence rate of blindness due to Type 1 diabetes ranged from 1.3/100,000 (CI: 0.5–2.2) to 0.1/100,000 (CI: –0.1–0.4). The incidence rate of blindness due to Type 2 diabetes was variable in the first subperiod, and it next decreased by 19% each year from 3.9/100,000 (CI: 2.5–5.3) to 0.7/100,000 (CI: 0.1–1.2); $p < 0.001$.*

CONCLUSIONS. *The Saint Vincent Declaration target of reducing diabetes-related blindness by one third appears to have been achieved in the Warmia and Mazury Region. (Eur J Ophthalmol 2006; 16: 722-7)*

KEY WORDS. *Blindness, Diabetes, Diabetic retinopathy, Incidence rate*

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INTRODUCTION

Diabetes is a chronic disease that often results in serious vascular complications, those affecting the eye being one of the main causes of blindness in developed countries (1). European countries differ in their political, economic, and health care systems. Poland, as a typical post-communist country, started rebuilding its healthcare

system in the mid-1990s; major healthcare system reforms were implemented in 1999. At present, as a new member of the European Union, Poland is attempting to achieve a quality of medical care similar to that in Western Europe. In the study we assessed whether the recent healthcare reforms in Poland had helped to achieve the important St. Vincent target of a significant reduction of blindness due to diabetes (2).

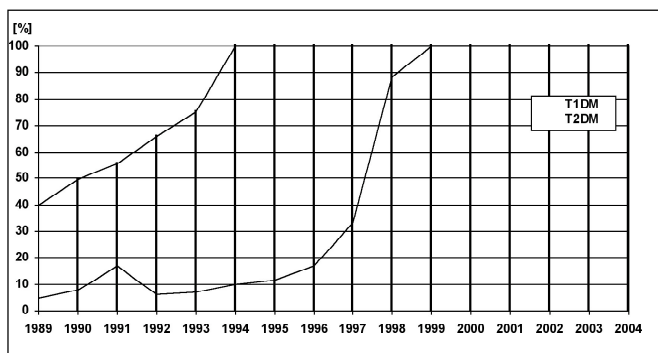


Fig. 1 - Proportion of registered blind patients with prior laser therapy in Type 1 diabetes mellitus and Type 2 diabetes mellitus by year of registration in the period 1989–2004.

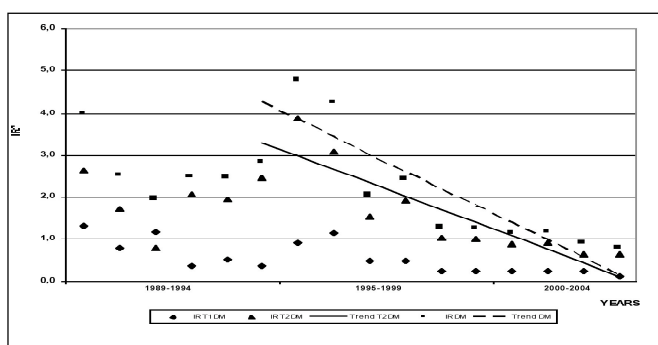


Fig. 2 - Incidence of blindness due to Type 1 diabetes mellitus and Type 2 diabetes mellitus by year for the period 1989–2004; test for trend and by year for the period 1995–2004. *Incidence per 100,000 total population

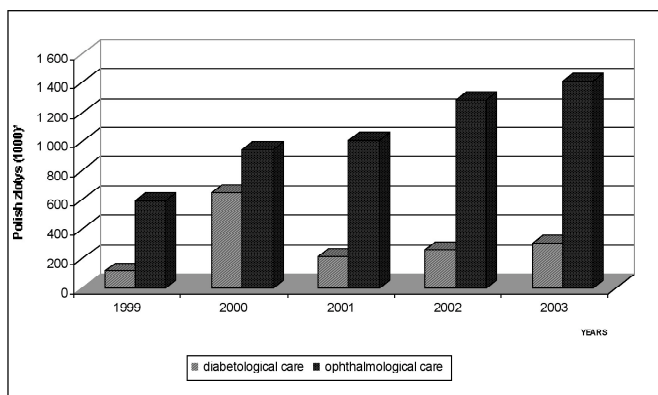


Fig. 3 - Financial funds for specialist diabetologic and ophthalmological care in the Warmia and Mazury Region in the years 1999–2003. *1 Polish zloty = 0.24 according to the official exchange rate as of September 2, 2005.

METHODS

The register of patients blind due to diabetes, residents of the Warmia and Mazury (W&M) Region (within the administrative borders from before 1999—population of 760,737) was analyzed from January 1, 1989, to December 31, 2004 (3). Completeness of ascertainment of the register was guaranteed by using two independent data sources: the primary information source was the clinical reports of diabetic patients from Olsztyn Diabetological and Metabolic Disorders Centre, ophthalmologic wards, outpatient diabetologic and eye clinics throughout the region, and the secondary source was the Warmia and Mazury Centre of Public Health register. The study comprised patients with Type 1 and 2 diabetes (T1DM and T2DM), classified according to the World Health Organization (WHO) criteria with blindness confirmed by documented cause-effect relation between diabetes and loss of vision (3). Blindness was diagnosed based on the WHO definition (vision acuity in the better eye following best possible correction <0.05 [3/60] or limited visual field $<20^\circ$) (4). Patients were qualified into the register by the same panel of experienced ophthalmologists based on clinical examination and documented exact cause of vision loss: proliferative diabetic retinopathy (PDR), diabetologic secondary glaucoma, clinically significant macula edema (CSME), and cataract coexistent with retinopathy or maculopathy (5).

The incidence rate (IR) of blindness due to diabetes was calculated as the number of newly diagnosed cases of blindness per 100,000 diabetic population/year and per 100,000 total population/year (3). The prevalence of diabetes was extrapolated to the population of the W&M Region based on the data from the whole diabetic population of Poland (6). Completeness of ascertainment (92.4%) was estimated by the capture-recapture method. Blindness incidence and its trends were determined between 1989 and 2004 with division into three subperiods.

Subperiod I – 1989–1994

- Post-socialist system.
- Organizing elementary diabetologic care before establishing proper diabetologic care program; laser therapy was available only in the academic medical centers in Warsaw and Katowice.

Subperiod II – 1995–1999

- Political-economic transformation.
- Healthcare system reform.

TABLE I - CAUSES OF BLINDNESS AMONG PATIENTS WITH DIABETES IN 1989–2004

Diabetologic eye disease	T1DM, n (%)	T2DM, n (%)
PDR	37 (53)	15 (7)
Neovascularization with glaucoma	14 (20)	17 (8)
CSME	11 (15)	88 (42)
Cataract associated with PDR or CSME	7 (10)	84 (40)
Unknown	1 (2)	6 (3)

T1DM = Type 1 diabetes mellitus; T2DM = Type 2 diabetes mellitus; PDR = Proliferative diabetic retinopathy; CSME = Clinically significant macular edema.

TABLE II - ASCERTAINMENT RATE AND INCIDENCE OF BLINDNESS DUE TO DIABETES BY YEAR BETWEEN 1989 AND 2004 IN THE DIABETOLOGIC POPULATION

Year	No.	General population	Diabetologic population	Ascertainment rate, %	IR*	95% CI
1989	30	751,322	29,302	80.5	102.4	65.7–139.0
1990	19	753,032	29,669	80.9	64.0	35.2–92.8
1991	15	757,169	31,044	83.2	48.3	23.9–72.8
1992	19	762,440	32,251	84.5	58.9	32.4–85.4
1993	19	765,909	34,696	82.9	54.8	30.1–79.4
1994	22	769,209	36,384	88.5	60.5	35.2–85.7
1995	37	771,714	37,814	95.7	97.8	66.3–129.4
1996	33	774,039	38,702	95.5	85.3	56.2–114.4
1997	16	775,958	41,126	94.2	38.9	19.8–58.0
1998	19	778,176	41,788	95.0	45.5	25.0–65.9
1999	10	780,204	42,521	96.6	23.5	8.9–38.1
2000	10	782,507	43,194	97.2	23.2	8.8–37.5
2001	9	783,009	43,849	97.3	20.5	7.1–33.9
2002	9	760,089	42,565	97.7	21.1	7.3–35.0
2003	7	760,737	44,039	99.2	15.9	4.1–27.7
2004	6	761,266	45,231	99.8	13.3	3.8–24.9

*Incidence per 100,000 diabetologic population

TABLE III - INCIDENCE OF BLINDNESS DUE TO T1DM AND T2DM BY YEAR FOR THE PERIOD 1989–2004 IN TOTAL POPULATION

Year	T1DM			T2DM		
	No.	IR*	95% CI	No.	IR*	95% CI
1989	10	1.3	0.5–2.2	20	2.7	1.5–3.8
1990	6	0.8	0.2–1.4	13	1.7	0.8–2.7
1991	9	1.2	0.4–2.0	6	0.8	0.2–1.4
1992	3	0.4	–0.1–0.8	16	2.1	1.1–3.1
1993	4	0.5	0.0–1.0	15	2.0	1.0–2.9
1994	3	0.4	–0.1–0.8	19	2.5	1.4–3.6
1995	7	0.9	0.2–1.6	30	3.9	2.5–5.3
1996	9	1.2	0.4–1.9	24	3.1	1.9–4.3
1997	4	0.5	0.0–1.0	12	1.5	0.7–2.4
1998	4	0.5	0.0–1.0	15	1.9	1.0–2.9
1999	2	0.3	–0.1–0.6	8	1.0	0.3–1.7
2000	2	0.3	–0.1–0.6	8	1.0	0.3–1.7
2001	2	0.3	–0.1–0.6	7	0.9	0.2–1.6
2002	2	0.3	–0.1–0.6	7	0.9	0.2–1.6
2003	2	0.3	–0.1–0.6	5	0.7	0.1–1.2
2004	1	0.1	–0.1–0.3	5	0.7	0.1–1.2

* incidence per 100,000 total population; T1DM = Type 1 diabetes mellitus; T2DM = Type 2 diabetes mellitus

- Initiating the diabetologic care program in order to optimize the timing of laser treatment.
- Within the diabetic eye disease screening:
 - 1) Establishing Diabetological and Metabolic Disorders Centre in Olsztyn to coordinate the activities of diabetologic outpatient clinics for children, adolescents, adults, pregnant women, ophthalmological clinic with laser therapy unit and educational team as well as family doctors (combined care);
 - a) Training family doctors, nurses, and dietitians in diabetes;
 - b) Organizing individual and group education for patients with diabetes.
 - 2) Screening program for detecting diabetic retinopathy combined with early laser therapy treatment:
 - a) Examination protocol: annual eye examination from the moment of diabetes recognition in all patients from the Warmia & Mazury Region;
 - b) Aids used: Snellen tables, ophthalmoscopes;
 - c) Contractors: general practitioners trained in using ophthalmoscopes and interpreting changes detected in the eye and specialist ophthalmologists trained in Ophthalmological Clinic of Medical Academy in Warsaw (documented annual ophthalmologic examination of the eye fundus through dilated pupil).

Subperiod III – 2000–2004

- EU membership.
- Introducing full program of diabetologic care, including color photography of the eye fundus for retinopathy screening.

Confidence intervals (CI) for annual incidence and incidence rate of referral and standardized incidence rates were calculated assuming the Poisson distribution. The trend in the incidence of blindness due to diabetes was estimated starting from the second subperiod of observation, i.e., from 1995, as IR between 1989 and 1994 was highly variable and therefore difficult to classify using the regression model (7). Statistical analysis was carried out with Statistica 6 software.

RESULTS

Among 280 visually disabled patients the major cause of blindness among diabetic patients was diabetic eye disease (97%); out of 70 patients with T1DM, PDR was the leading cause of blindness (53%), while CSME and

cataract associated with PDR or CSME predominated among 210 patients with T2DM, being the cause of blindness in 42% and 40% of them, respectively (Tab. I).

In 1989 laser treatment for PDR became available to about 40% of patients and in 1995 to every patient with T1DM before blindness onset, whereas only about 5% of patients with T2DM had laser therapy before registration of blindness between 1989 and 1995 (Fig. 1).

Table II. shows total and diabetic population in the W&M Region. The incidence of blindness due to diabetes/100,000 diabetic population/year was the highest in 1989, namely 102.4/100,000 diabetic population. In 1995 it was 97.8/100,000 diabetic population, and then it decreased to 13.3/100,000 diabetic population in 2004. Register ascertainment increased from 80.5% to 99.8% within the study period.

As follows from Table III and Figure 2 the incidence of blindness due to diabetes in the general population in the first period was highly variable; in the subsequent subperiods it decreased by 19% each year from 4.8/100,000 (CI: 3.2–6.3) to 0.8/100,000 (CI: 0.2–1.4); $p < 0.001$. The incidence of blindness due to T1DM ranged from 1.3/100,000 (CI: 0.5–2.2) to 0.1/100,000 (CI: –0.1–0.4). In contrast, the incidence of blindness due to T2DM was highly variable in the first subperiod, but in the second and third subperiods it decreased by 19% each year from 3.9/100,000 (CI: 2.5–5.3) to 0.7/100,000 (CI: 0.1–1.2); $p < 0.001$.

In the years 1999–2003 the funds for outpatient diabetologic care increased from 114,000 to 304,000 Polish zlotys, and for ophthalmologic care from 590,000 to 1,408,000 Polish zlotys (Fig. 3).

DISCUSSION

Throughout the last 25 years a radical progress has been achieved in the treatment of diabetes and its complications. In the 1990s, after announcing the SVD, the governments of European countries realized the Declaration's significance, which resulted in changes in the organization of diabetologic care in Europe (2). The changes of organizing structures in the post-socialist countries proceeded much more slowly than in highly developed countries. Hence, the years 1989–1993 were devoted to organizing elementary diabetologic care in the region. These basic activities allowed for better metabolic control of diabetes and a more optimistic insight on the possibility of

reducing diabetologic complications in the future.

Throughout the study period, among 280 registered blind patients in the W&M Region, the major cause of blindness in patients with T1DM was PDR and in patients with T2DM CSME, which is confirmed by other authors (8-11). Blindness incidence in the diabetic population in the initial observation period, during unfavorable political-economic conditions and lack of organized diabetologic care, varied and was the highest in 1989, 102.4/100,000, and 1995, 97.8/100,000; in the subsequent years it diminished to reach 13.3/100,000 in 2004. Trautner et al reported blindness IR in Germany as 60.6/100,000 diabetic population/year in the years 1990–1998 (12). Incidence of blindness due to T1DM in total population/year was low throughout the observation period, ranging from 0.8/100,000 to 0.1/100,000. In the years 1999–2004 there were registered only two cases per year. Similarly, a low number of patients blind because of T1DM was reported by Agardh et al (13).

Incidence rate of blindness due to T2DM in total population during the initial observation period (1989–1994) increased considerably, from 1.7/100,000 to 2.5/100,000. Similarly, in northwest Italy the incidence of diabetic retinopathy-related blindness did not show any trend to decrease over the 25 years investigated (11). In our case, IR increase was on the one hand related with epidemic growth of diabetes incidence (6), but on the other, though it may sound paradoxical, with better diabetologic care. Improved care increased patients' lifespan but it also generated a greater number of patients with vascular complications, including retinopathy. In the years following the introduction of standards in diabetologic care and retinopathy screening program, the incidence rate of blindness decreased to 0.7/100,000 in total population in 2004. According to a Swedish study, the incidence of blindness due to diabetes in Stockholm County fell by more than 50% over a 15-year period (14). In contrast, in the years 1990–1998, there was no significant change in Württemberg-Hohenzollern, Germany (12), whereas in Aarhus County, Denmark, in the years 1993–2002 there was observed a decrease in the incidence of blindness due to PDR in patients with T1DM with simultaneous increase in the incidence of blindness due to maculopathy in patients with T2DM (9). As can be seen from the presented data, a decrease in blindness incidence rate was observed in highly developed countries which make use of retinopathy screening (12-14). In Poland, no national retinopathy screening program has been introduced. A

decrease in blindness incidence rate by 93%, which was achieved mainly among patients with T2DM, should be ascribed to the Warmia and Mazury regional program of retinopathy screening and early photocoagulation treatment. The program was carried out owing to the health-care system reform in 1999. Owing to the general opinion about the poor condition of Polish healthcare, the funds for specialist outpatient diabetologic and ophthalmologic care increased (Fig. 2) (15). Owing to regional funding it was possible to introduce color photography into the screening program. Establishing the institution of family doctors in 1999 facilitated a combined kind of healthcare.

Improved diabetes education of patients and more frequent self-monitoring of blood glucose has probably resulted in better glycemic control. Introduction of the screening program has provided better information about the need and timing of eye checkups, and has reduced the number of patients blind due to diabetes, thus helping to achieve the St. Vincent targets (2). We hope it may also be possible to achieve this in other parts of Central and Eastern Europe.

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