

20 The annual evaluation 1999.

Diab-Base is a comprehensive software program for management of diabetes. Today it is used by twenty-four clinics in Sweden and one clinic in Norway. The system is part of a treelike medical information system that has some similarities with the Internet. There are branches and homepages for different investigations or procedures. The patient has a homepage for her chronic disease diabetes. She can have other diseases and thereby other related homepages. In contrast to Internet information can be inherited between pages. The system thus consists of a web of relations and is not limited to a web of objects with links, which is the case of the Internet.

The development of Diab-Base started 1984 and the architecture improved considerably when the team of Journalia Inc. developed systems for heart surgery in 1992. We were then forced to catch details in order to produce the medical record and calculate risks. This enterprise was fruitful for other areas of medicine. Diabetes has a cascade of consequences in health and economy like heart surgery. Risk can now be calculated from large materials as a function of several variables.

Data from the database can of course be used for benchmarking that can give incentive for action. We can now go even further and analyze data in order to guide better and optimize treatment. The medical record is compiled from coded sentences together with other codes and free text.

The architecture of a medical information system should not only be a technical question of communication within the system. The system must also reflect our attitudes toward the patient. We should ask how our diabetic patient is involved by the system. There is a need for “reengineering” of care. The patient should also get close to the screen and get information from it together with the nurse or doctor. Handout letters with individual plans belong to the elements of success. The team need to share information and work with documentation where all efforts are made to remove double work from the scene.

The present book in Swedish is made for education of users in Sweden but a glimpse of the pages with screen-dumps, laboratory codes, codes of events, formats for letters to the patient, etc., can also be fruitful for colleagues from other countries. The following pictures with English text present some of the findings from our studies.

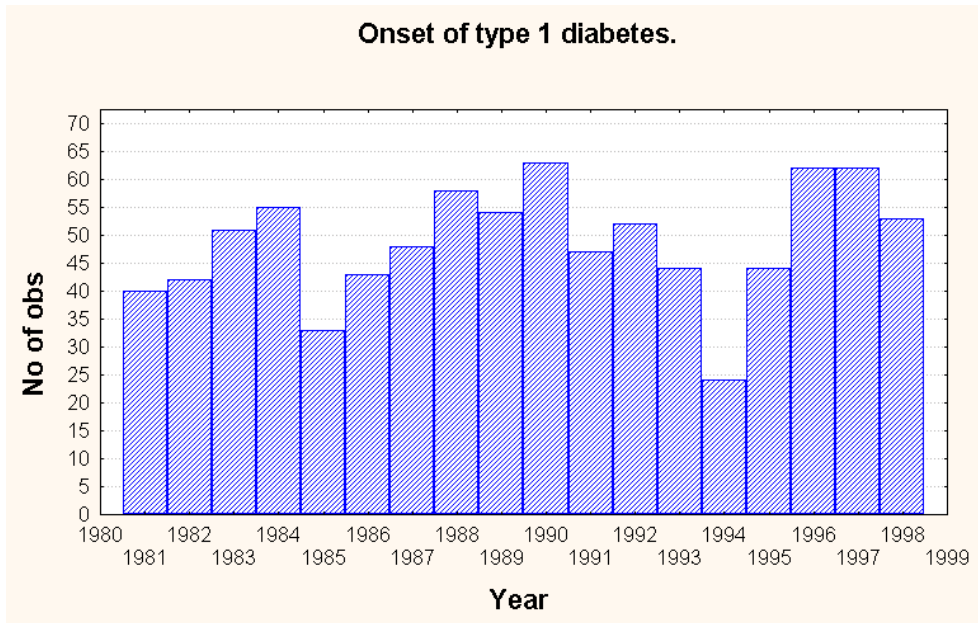


Figure 1. When we make reports regularly we can follow how incidence changes.

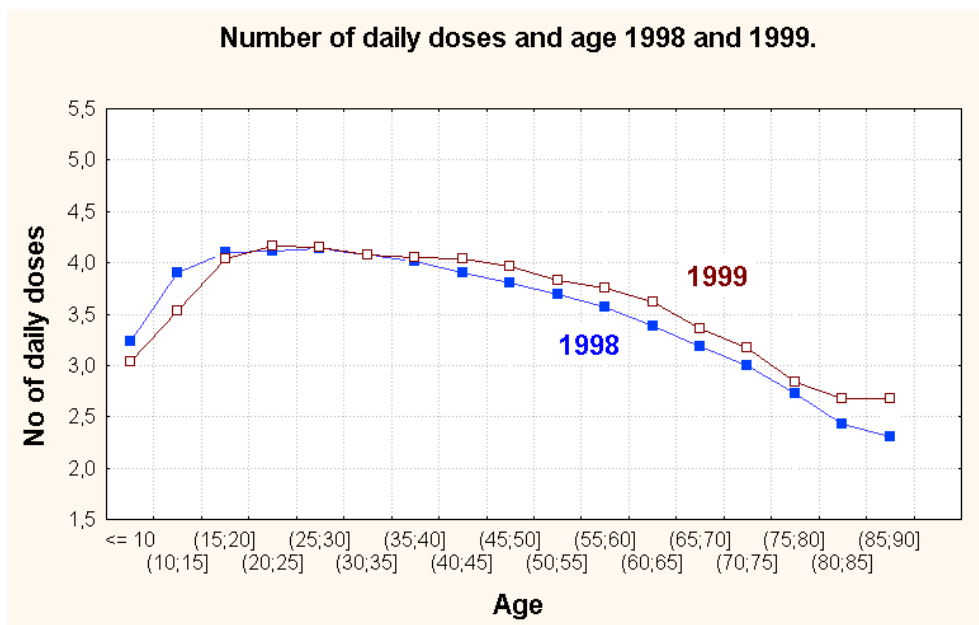


Figure 2. The use of multiple injections of insulin therapy is now conventional in younger ages and is also more common in higher ages.

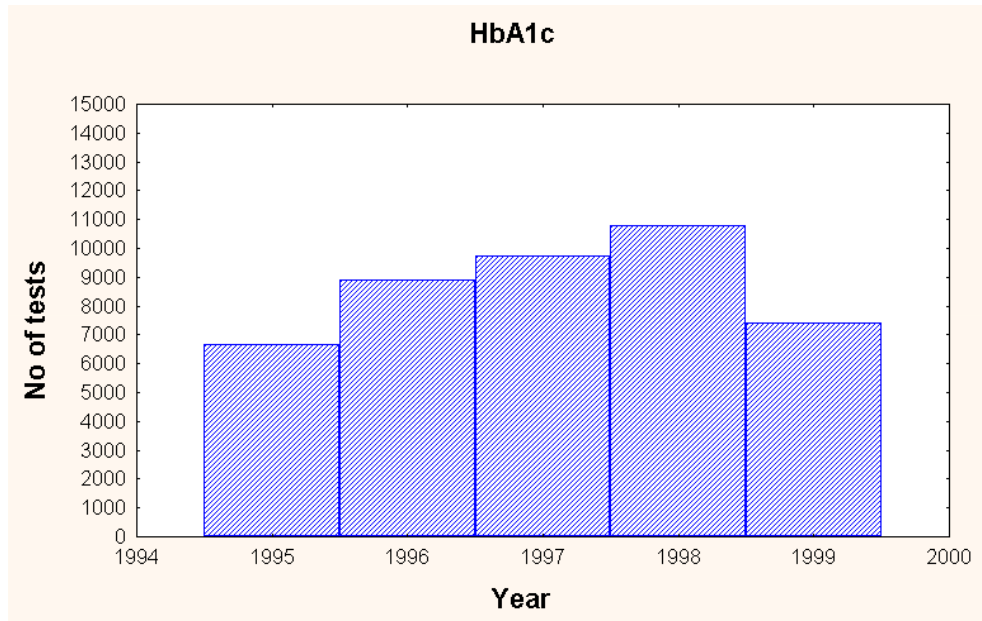


Figure 3. 40000 HbA1c tests from 12 clinics during 5 years (12000 patients).

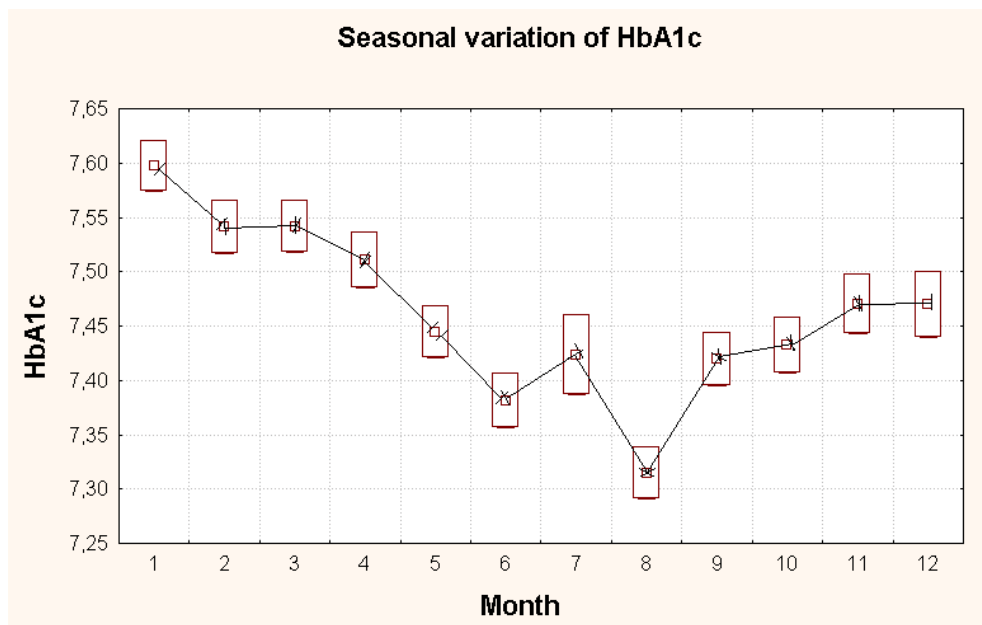


Figure 4. Seasonal variation of HbA1c. Mean + SE.

Distribution of HbA1c.

n	43442
mean	7.465
SD	1.554
3rd moment	0.549
4th moment	4.191
median	7.335

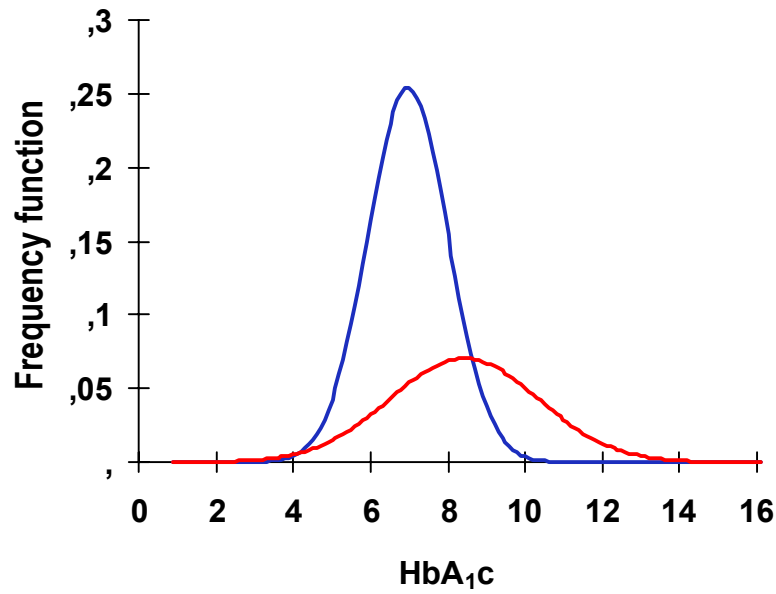
Figure 5. Distribution of HbA1c is not normal. Third moment should be zero and the fourth moment three in a perfect normal distribution.

Multiple regression analysis with transformed HbA1c as a dependent variable.

	Male			Female		
	b	SE	p-value	b	SE	p-value
Constant	0.12849	0.04654	0.0058	-0.00181	0.04462	0.9676
Current age	-0.00784	0.00049	0.0000	-0.00742	0.00051	0.0000
Time period since 1995	-0.02063	0.00614	0.0008	-0.03348	0.00697	0.0000
BMI	0.00276	0.00191	0.1485	0.01458	0.00174	0.0000
Duration	0.01049	0.00067	0.0000	0.00613	0.00072	0.0000
Smoking	0.20665	0.02502	0.0000	0.09512	0.02834	0.0008

Figure 6. Smoking will worsen metabolic control and is equal to 20 years of diabetes duration in its effect on HbA1c in men. There was a larger importance of BMI in women.

Example: A smoking man 65 years of age with start in 1999, BMI 25, 12 years of diabetes duration. $0.12849 + (65 * (-0.00784)) + (4 * (-0.02063)) + 25 * 0.00276 + 12 * 0.01049 + 1 * 0.20665 = -0.062$. When this value is transformed back to HbA1c the expected value is 7.8 %.



	Group with a low HbA1c		Group with a high HbA1c	
	Mean	SD	Mean	SD
Hba ₁ C	6.97	1.04	8.42	1.93

Figure 7. We found two normal distribution curves within the distribution of HbA1c. What is the cause ? We have to investigate more.

Men

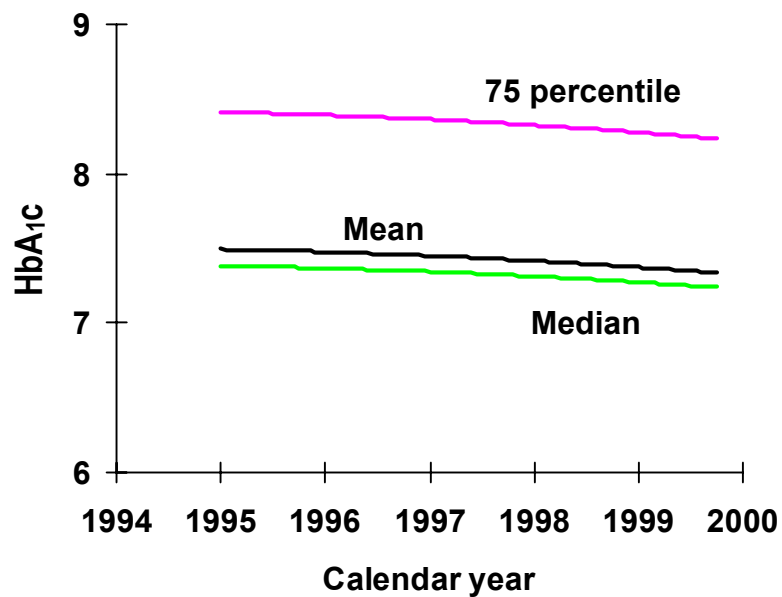


Figure 8. HbA1c is decreasing among men, but is it by better care or are we observing some other factor behind this fall. A similar development was found for women.

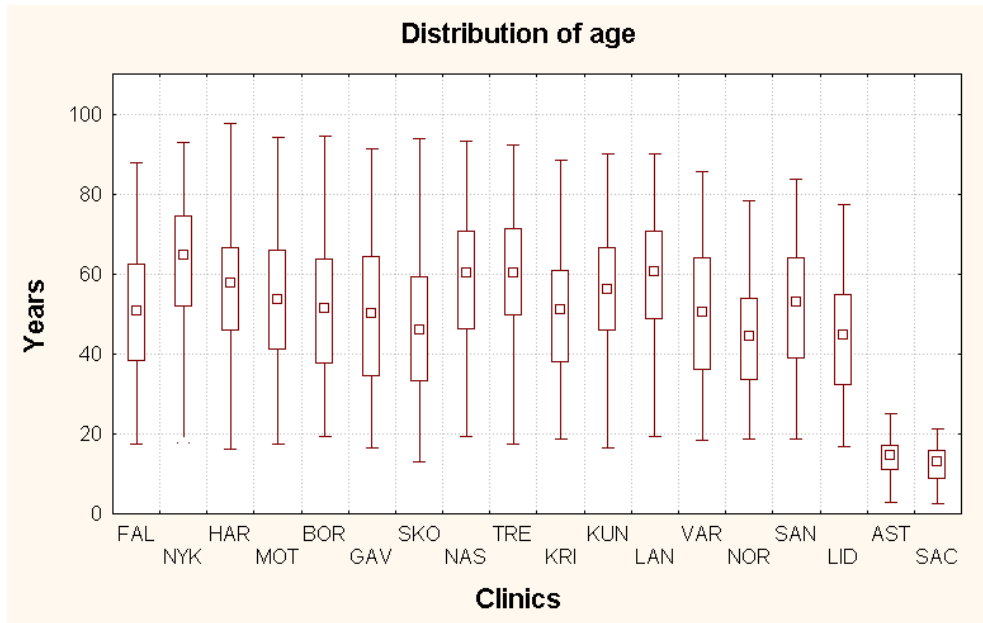


Figure 9. There were two pediatric clinics participating.

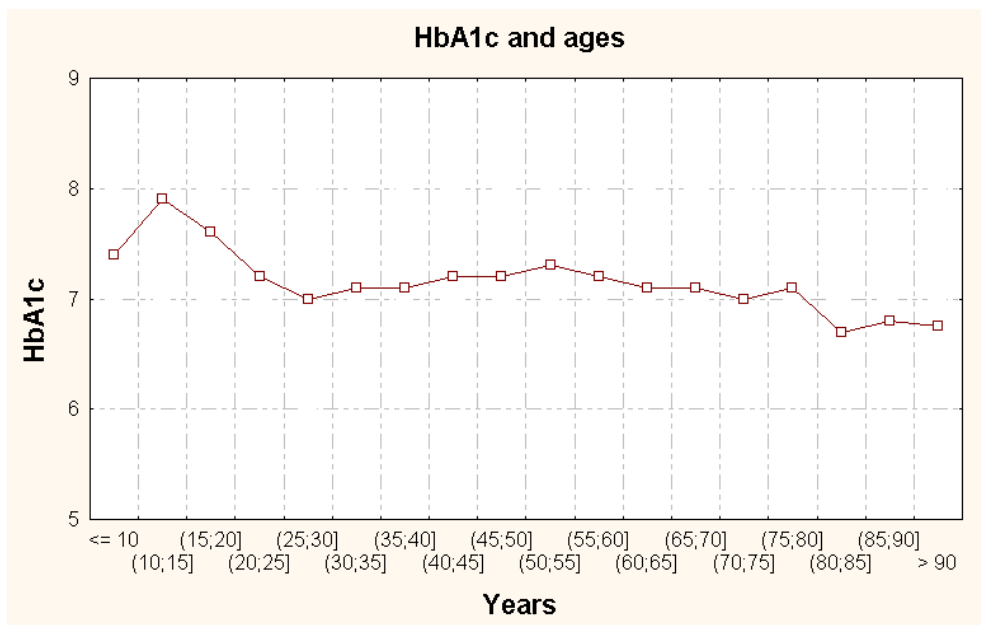


Figure 10. HbA1c and ages. Treatment difficulties of children with diabetes or a methodological phenomenon ?

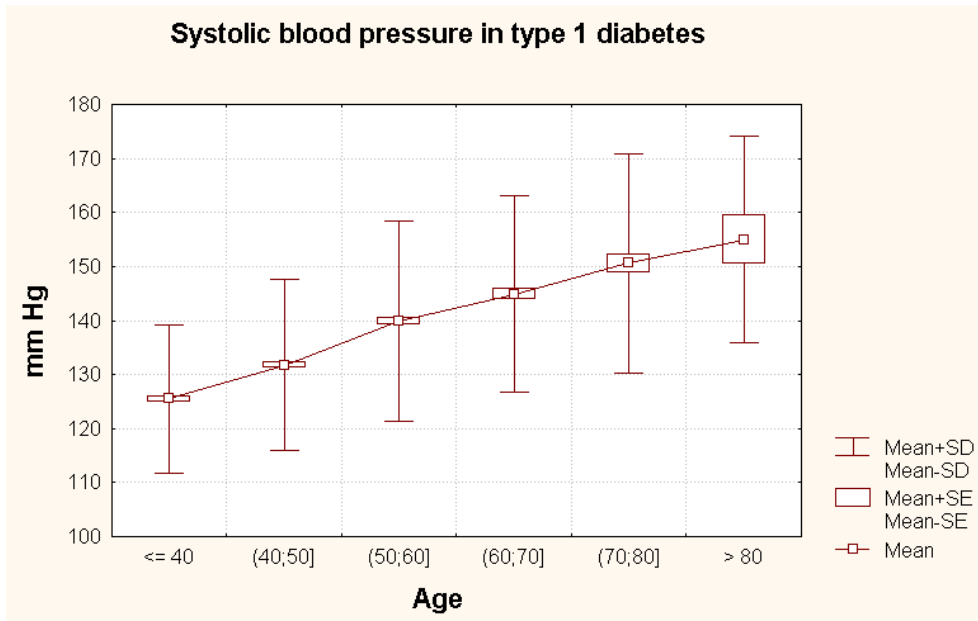


Figure 11. Age and systolic blood pressure in type 1.50% above the goal in elderly. What can we improve and gain ?

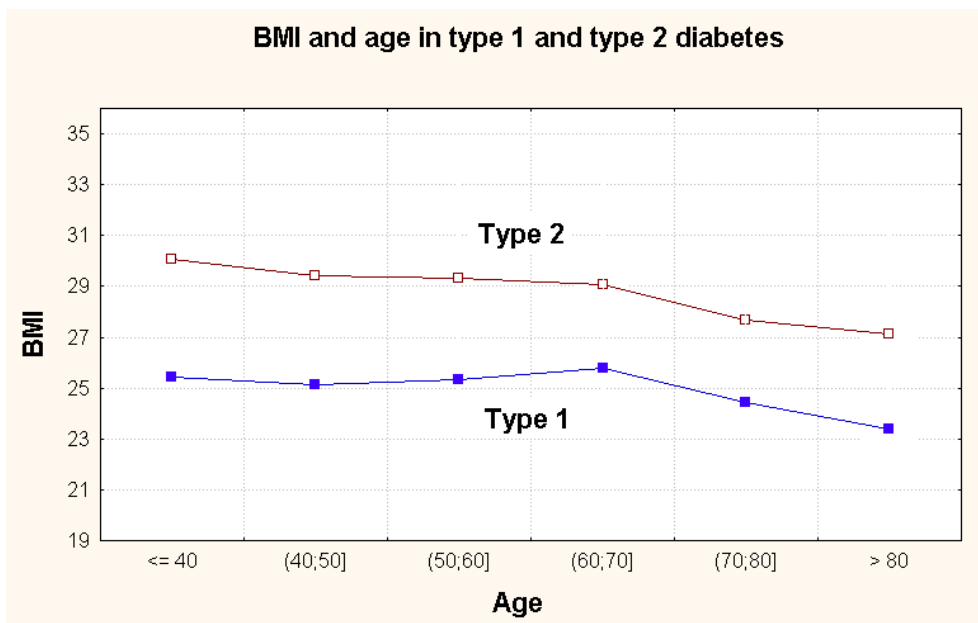


Figure 12. Age and BMI in type 1 and type 2. Obesity also in type 1.

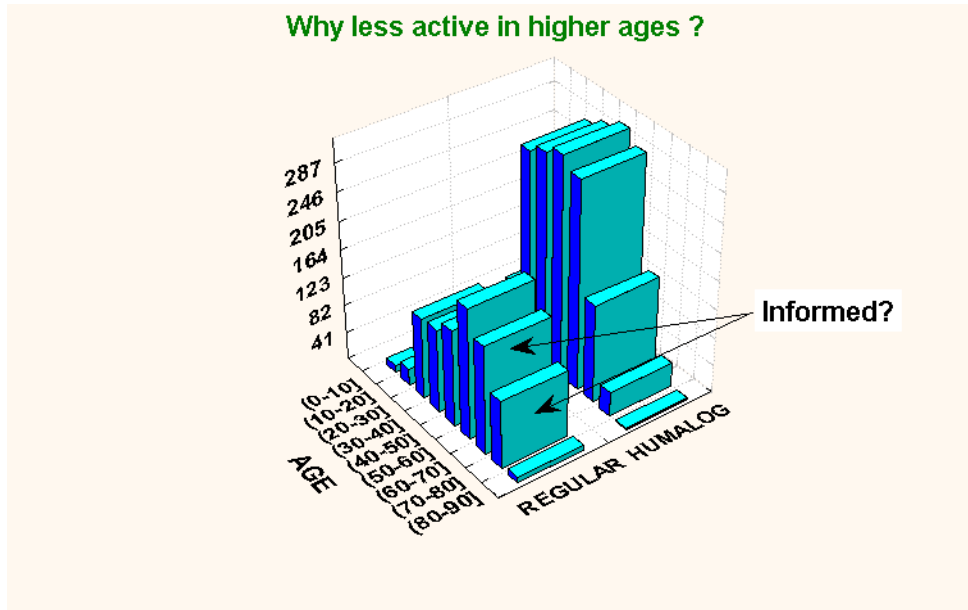


Figure 13. Age and use of Humalog.

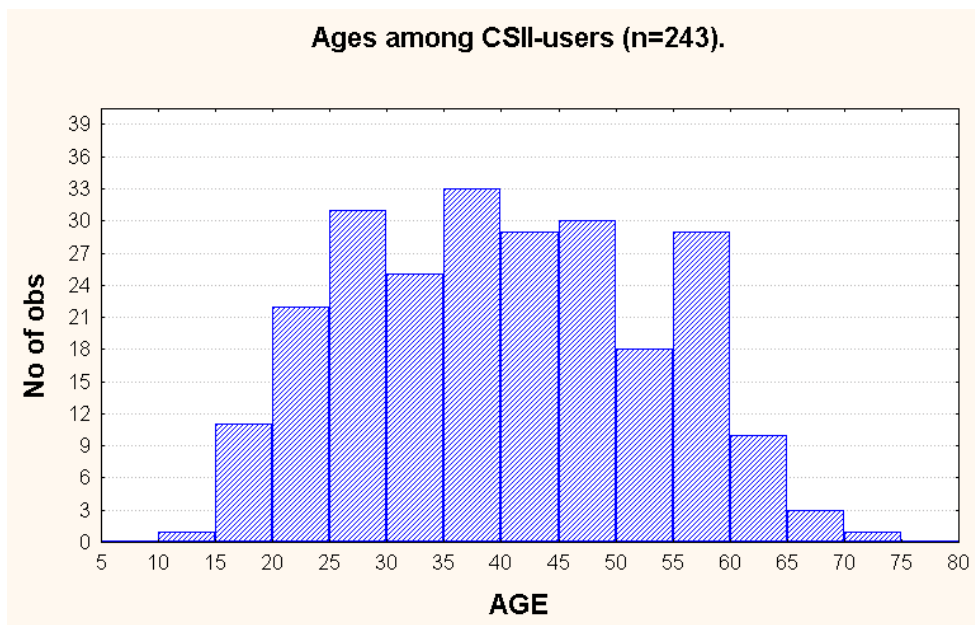


Figure 14. Age and use of CSII.

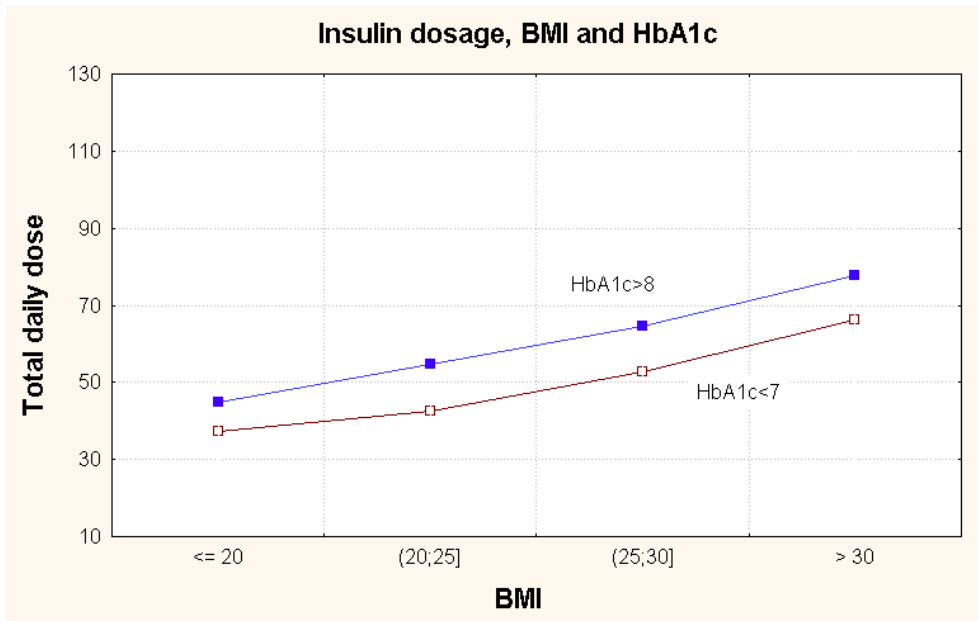


Figure 19. The more insulin we give the worser it will be ?

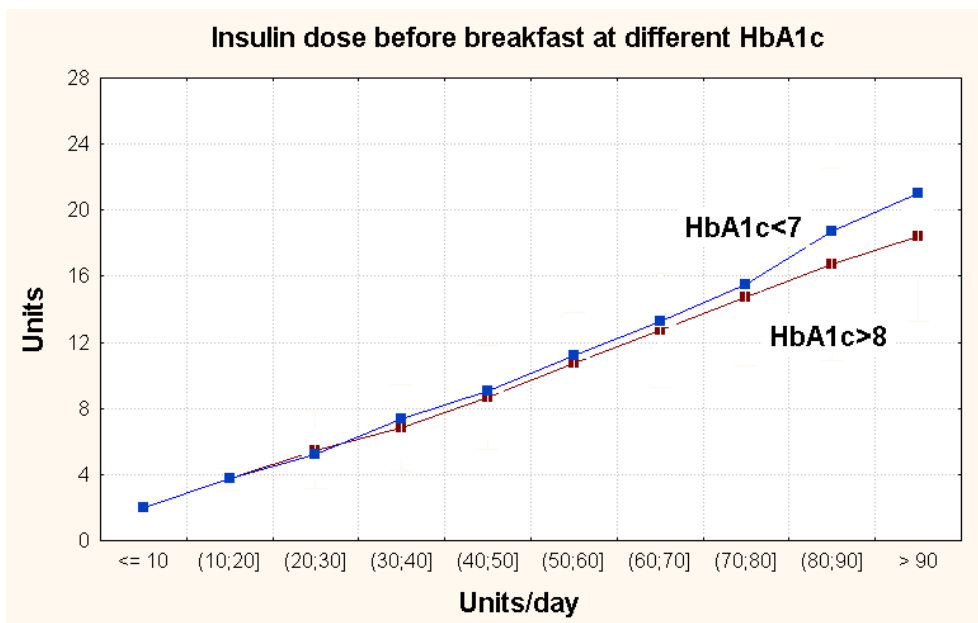


Figure 20. We can learn from those with good metabolic control. They increase the dose.

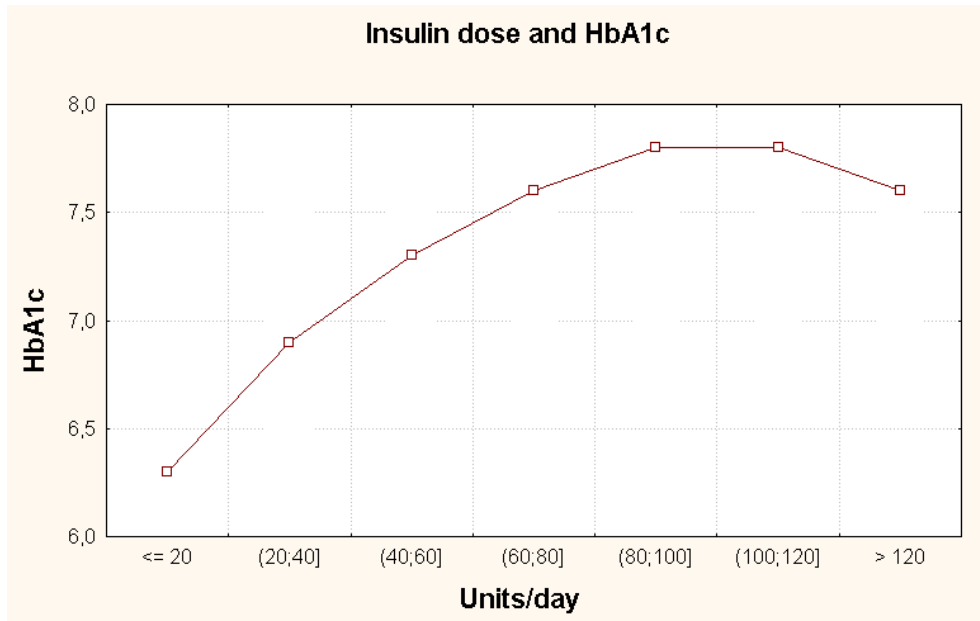


Figure 21. Improved metabolic control with higher doses.

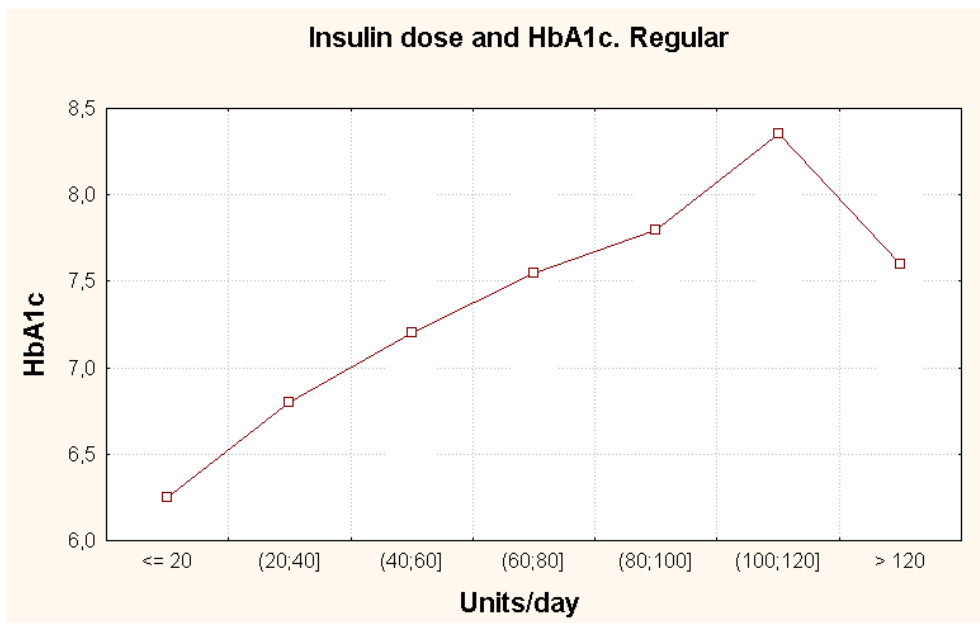


Figure 22. There is a threshold for regular insulin.

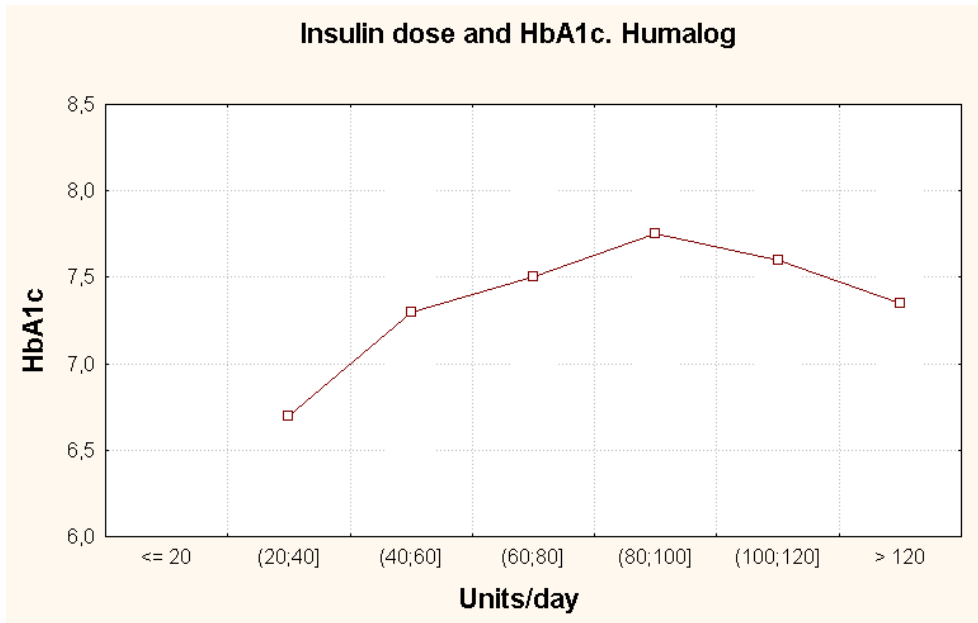


Figure 23. Is this threshold lower for Humalog ?

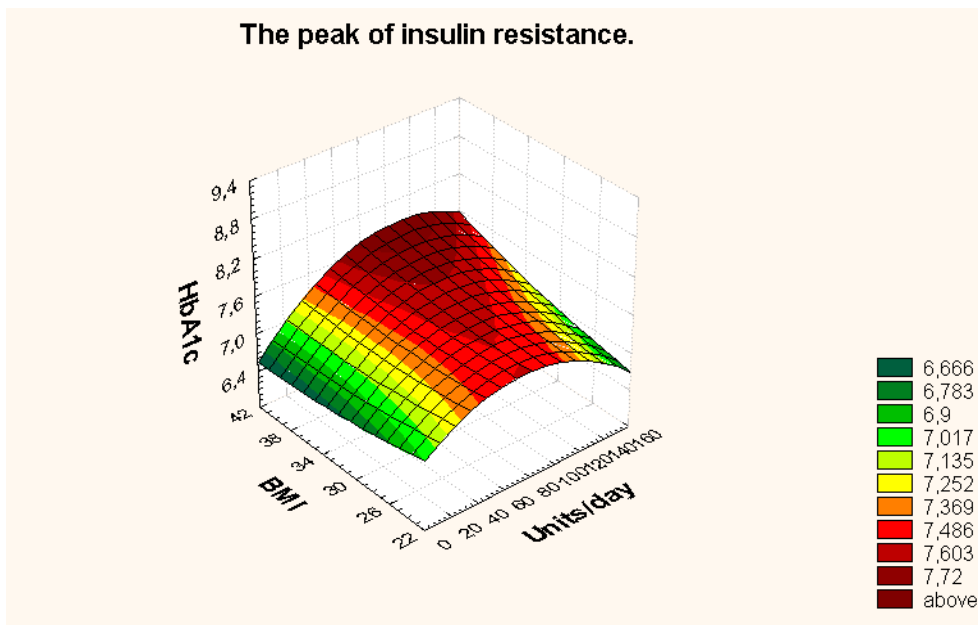


Figure 24. We need to optimize and get away from the top.

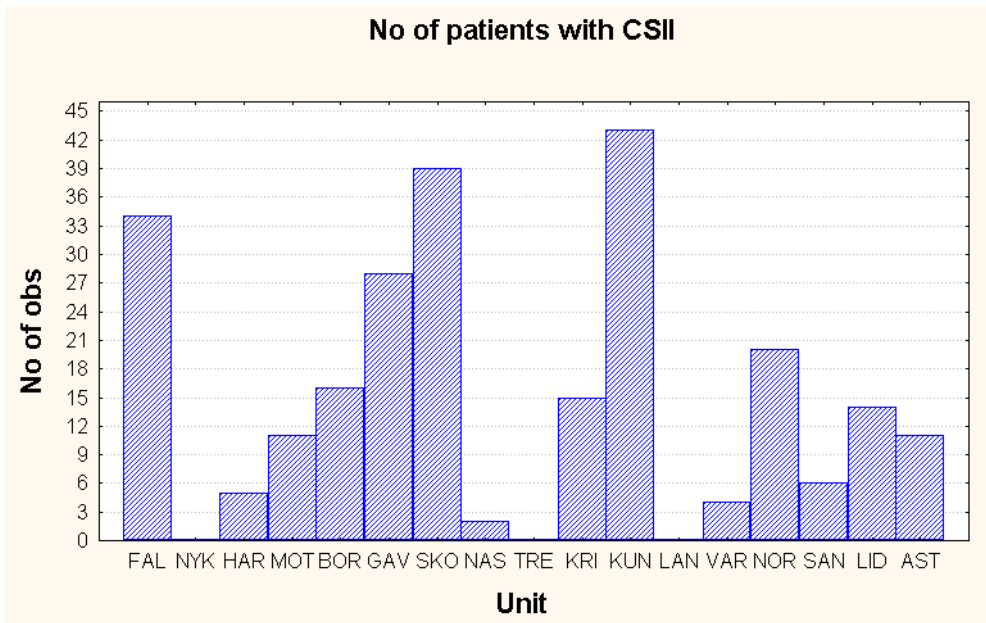


Figure 25. Care is patchy as far as use of CSII.

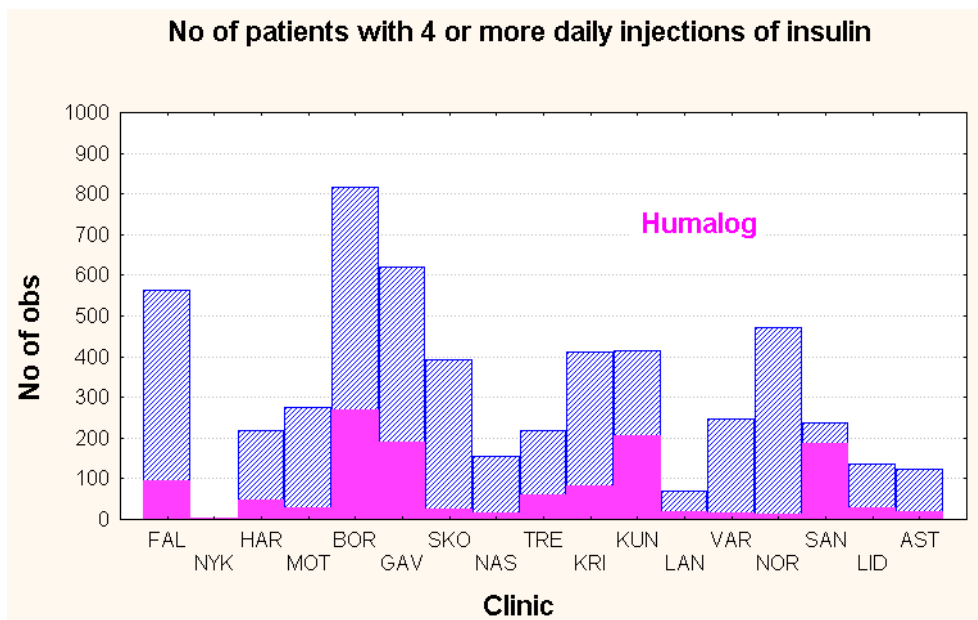


Figure 26. We are also patchy as far as use of a newer insulin.

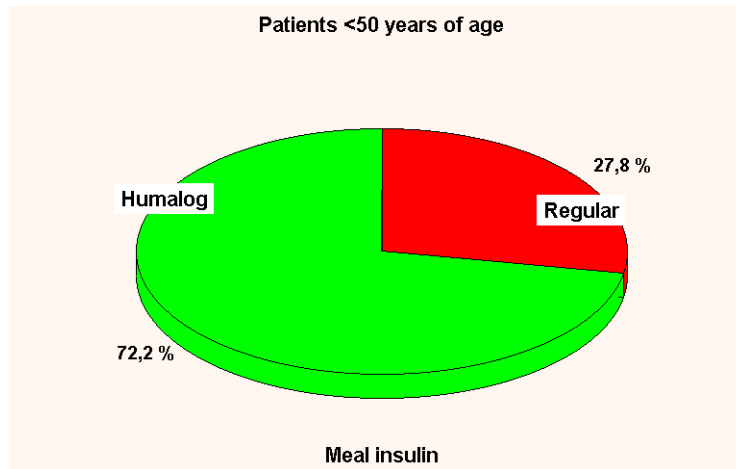


Figure 27. We are more prone to prescribe Humalog to young diabetic patients.

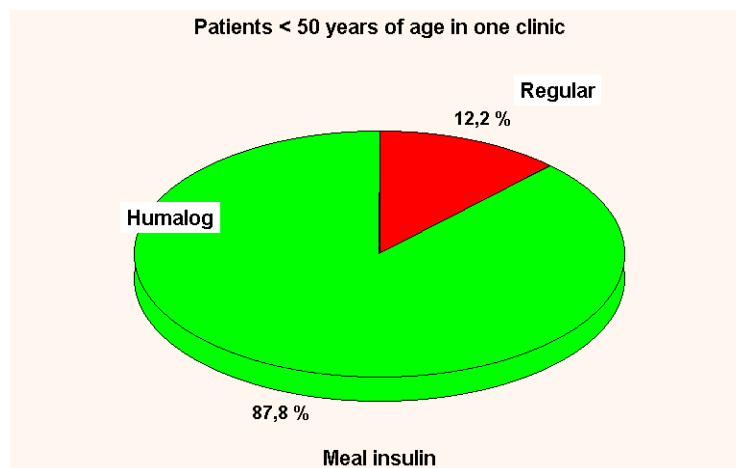


Figure 28. Some clinics switch over almost 90% of their patients.

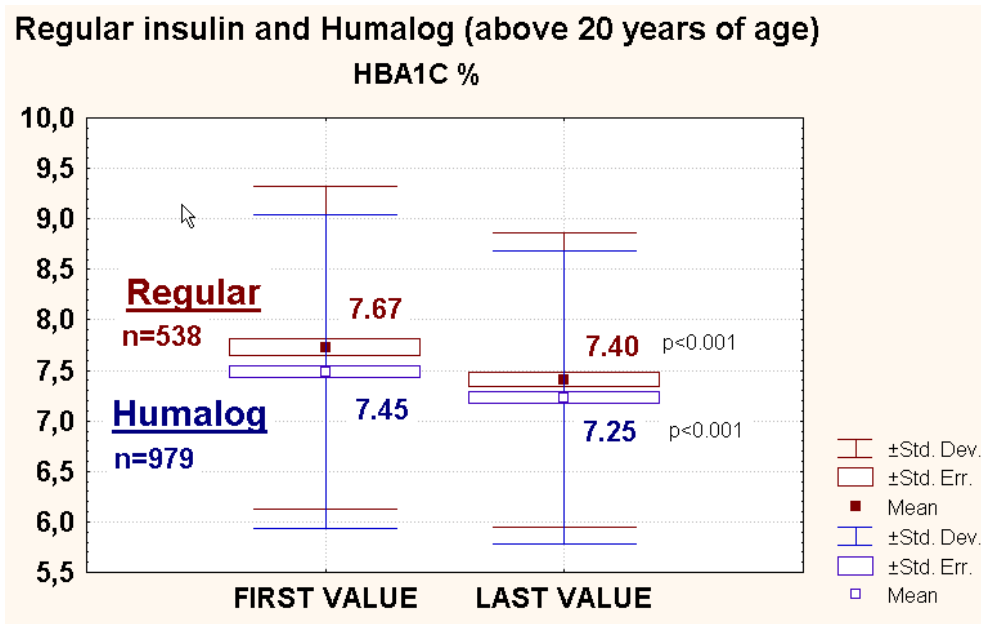


Figure 29. Most patients on Humalog had been treated with regular insulin prior to the first HbA1c value. Mean age was 43.0 years (SD 13.4) and duration of insulin treatment 14.8 years (SD 11.7). Patients on regular insulin were 50.5 years of age (SD 15.5) and duration of insulin treatment was 16.8 years (SD 12.7).

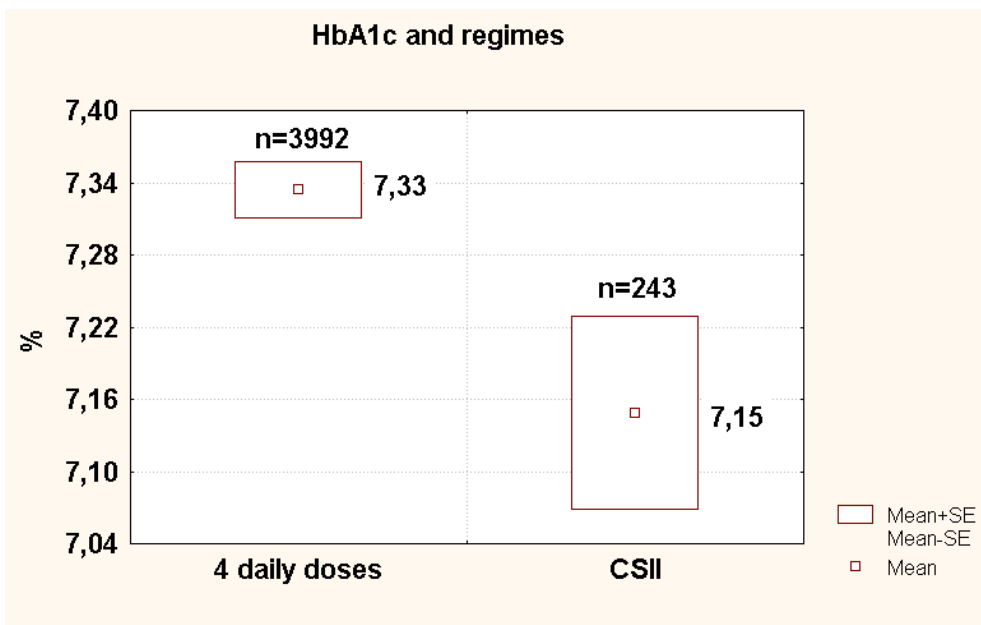


Figure 30. Compared to a multiple dose regime insulin pump therapy gave a better metabolic control measured with HbA1c.

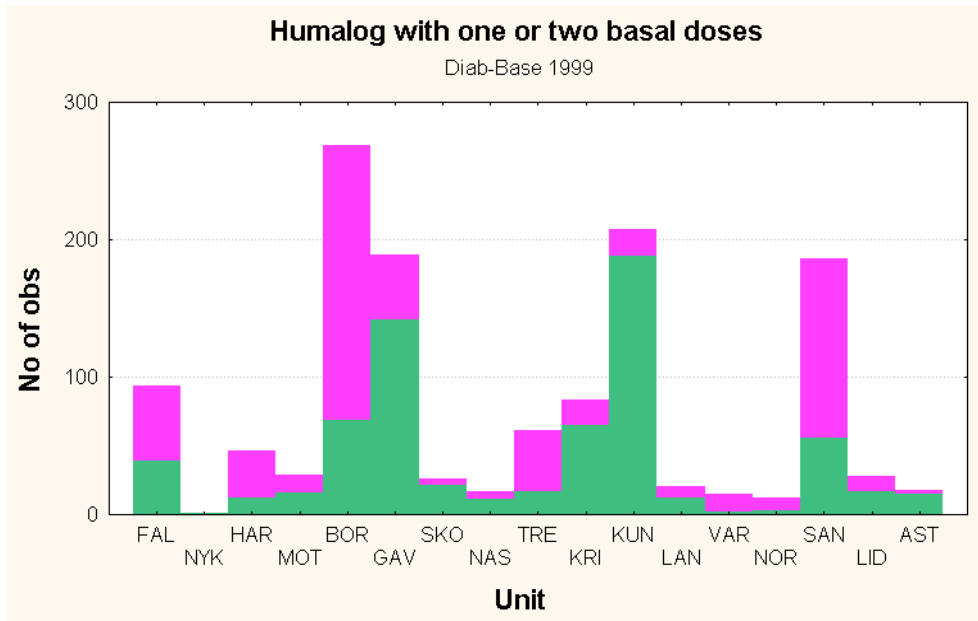


Figure 31. Some clinics regard it as almost necessary to give two basal doses of NPH or Ultralente when they use Humalog. Maybe a mixture 50/50 (Humalog/NPH) for all meals is ideal. Something to test ?

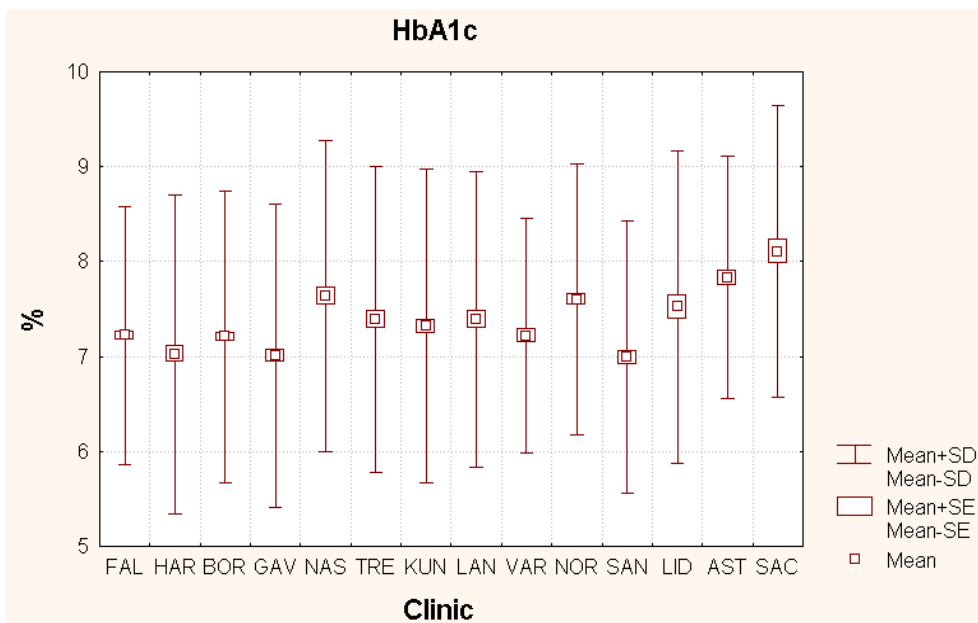


Figure 32. And what can we learn from this ? We need to standarize or calibrate!
More important to know how to optimize treatment than
to give an impression of competition.