HOW ANALYSIS OF BIG DATA IN LABORATORY MEDICINE CAN IMPROVE HEALTHCARE MANAGEMENT

An example of diabetic patient care improvement in French laboratories

Dr. Stankevich L.I.[1], Gontard P.C.G[1], Dr. Galhaud J.P.[2]
[1] Gontard & Cie Group,Geneva, SWITZERLAND; Moscow, RUSSIA; Dubai, UAE
[2] Labexa Group Laboratories (Exalab, LBA, Sealab) Bordeaux, Nerac, Bayonne, FRANCE

BACKGROUND

Diabetes is one of the leading diseases in the world with more than **400 million** diabetics globally.

Diabetes will become the **7th cause** of death in the world by 2030 (WHO forecast).[1]

To improve diabetes care management, we used a big data analysis to show how the HbA1c prescriptions can be improved.

METHODS

In this work, we did a retrospective study of the results of the HbA1c level of our patients; data from more than 110 000 patients (more than 200 000 HbA1c tests) was analysed.
Different parameters were closely examined:

- Information about number of patients and patient visits
- Test result and age averages
- Average result by age
- Result type (diabetes, grey zone, low risk zone)
- Visits analysis
- Information about prescribers and possible assay increase.

WHAT WE DID WITH DATA

Database analysis allows us to know:
How to talk to prescribers and what to talk about.
How the laboratory can bring more potential benefits.
How we can manage it.

We used a step by step approach and propose 4 solutions to support clinicians:

1. Information for prescribers in the lab report about references for diabetes screening and monitoring **(see annex 1)**
2. Development and issue of booklets («comics») as well for doctors and for patients
3. Training programs for lab specialists
4. Seminars and conferences for the clinicians

Annex 1: Information we have added in the lab report

HbA1c - CRITÈRES DE DÉPISTAGE*
Recommandations: OMS, ADA, IDF, EADS**

- Patients > 45 ans
- Patients < 45 ans, avec facteurs de risques

Normale	«Zone grise»	Pathologie
HbA1c **< 5.7 %** 39 mmol/mol	HbA1c **5.7% ≤/≤ 6.4%** 39 mmol/mol – 48 mmol/mol	HbA1c **≥ 6.5%** 48 mmol/mol
Risque faible de diabète	Pré-diabète possible	Diagnostic de diabète

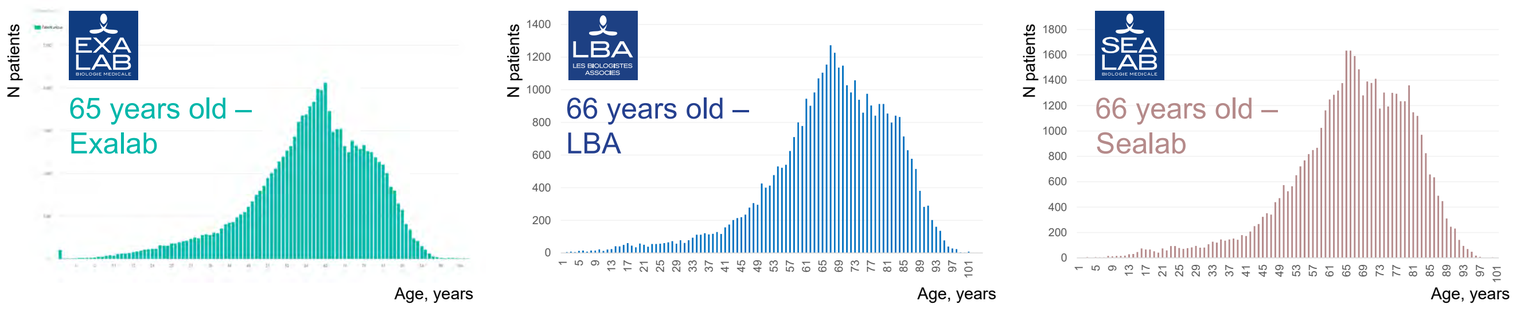
FRÉQUENCE DES CONTRÔLES D'HbA1c

Tous les 3 ans	À contrôler dans 3 mois***	Suivre les recommandations HAS (cf p1)

* En dehors de toute hémoglobinopathie. ** OMS: Organisation Mondiale de la Santé. ADA: American Diabetes Association. IDF: International Diabetes Federation. EADS: European association for the study of diabetes. Fréquence à l'appréciation du médecin. *** Ceci n'est communiqué qu'à titre informatif et le choix des analyses à prescrire reste de l'entière responsabilité du médecin en fonction du contexte clinique du patient.

RESULTS

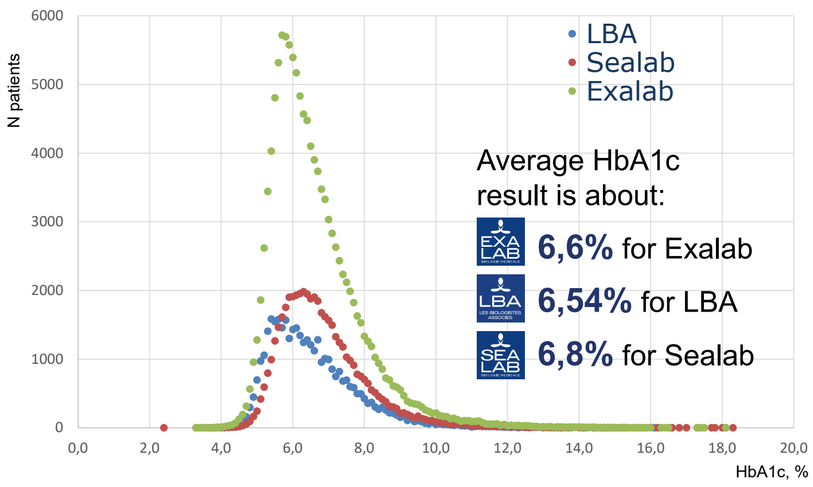
HBA1C STATISTIC, DETAILED ANALYSIS FOR LABEXA GROUP: AVERAGE AGE OF PATIENTS



Examination of population tested with HbA1c shows an average age above 65 years although recommendation is 45 years[2]. That means that HbA1c in our laboratories is requested mostly for monitoring in accordance with the French national recommendations.

IT SEEMS POSSIBLE TO GIVE A GREATER VALUE TO THE DIAGNOSIS BY USING IT FOR SCREENING PURPOSES. [3]

HBA1C STATISTIC, DETAILED ANALYSIS FOR LABEXA GROUP : AVERAGE HBA1C RESULTS



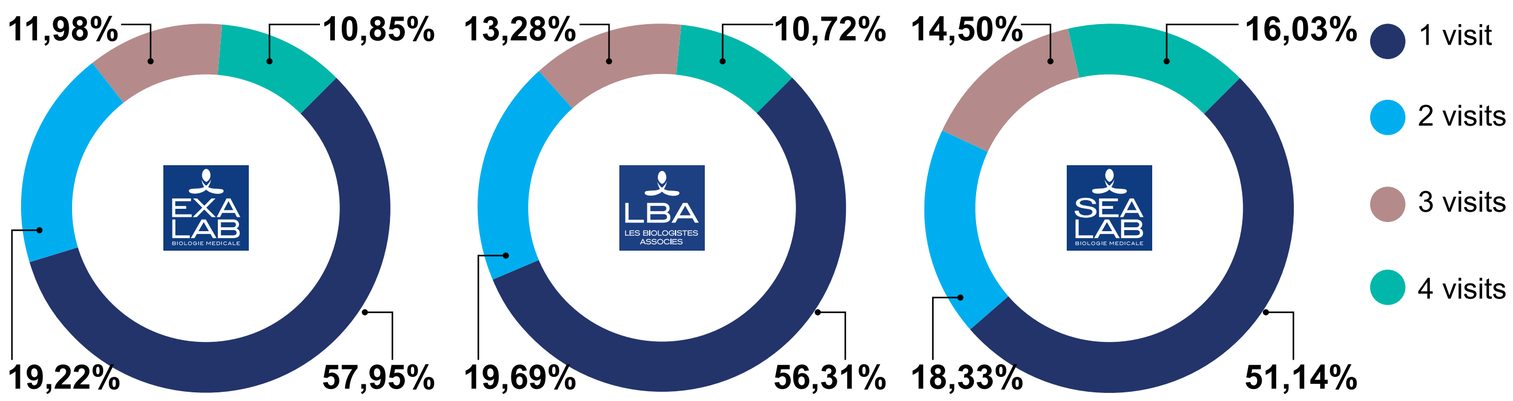
RESULTS BY TYPE DISTRIBUTION, %

	EXALAB	LBA	SEALAB
Diabetes HbA1c ≥ 6,5 %	45,51	45,02	56,41
Grey Zone HbA1c 5,7 – 6,4%	33,62	28,96	30,86
Low risk HbA1c <5,7 %	20,87	26,02	12,73

The average result for HbA1c value was pathological: 6,6 % (NGSP).
WHO and ADA define an HbA1c cut-off criteria for type 2 diabetes diagnosis as 6,5 % [2].

APPROXIMATELY 30% OF RESULTS WERE IN A GREY ZONE (HBA1C 5,7-6,4%), THAT IS RECOGNIZED BY ENDOCRINOLOGISTS AS "PRE-DIABETIC" RESULTS.[4]

HBA1C STATISTIC, DETAILED ANALYSIS FOR LABEXA GROUP : NB OF VISITS PER YEAR (2016)



WE FOUND THAT ONLY 13% (10,72 %–16,03 %) OF DIABETIC PATIENTS UNDERGO 4 TESTS PER YEAR, WHICH IS RECOMMENDED FOR DIABETES MONITORING [5].

ACHIEVEMENTS

Due to interaction with prescribers discussing this data we achieved:

- An increase of the HbA1c testing mostly due to the use of it for diabetes screening
- Among screening patients, we found up to 10% of pathological results and approximately 35% of grey zone results ("pre-diabetics")
- Special report of HbA1c testing by patient was created for each prescriber to assist physicians to better manage the monitoring of diabetic patients

+ 3,5 % Patients tested for HbA1c between 2016 and 2017

+ 2,5 % HbA1c tests between 2016 and 2017

CONCLUSION

A BIG DATA ANALYSIS APPROACH LETS US IMPROVE DIABETES MANAGEMENT CARE AS MUCH FOR THE MONITORING OF DIABETIC PATIENTS AS FOR DIABETES SCREENING EFFICIENCY

REFERENCES

[1] Global report on diabetes. World Health Organization, Geneva, 2016.
[2] Guidelines and Recommendations for Laboratory Analysis in the Diagnosis and Management of Diabetes Mellitus Clearinghouse (NDIC).
[3] Use of glycated Hemoglobin (HbA1c) in the Diagnosis of Diabetes Mellitus Abbreviated Report of a WHO Consultation. World Health Organization 2011
[4] Diabetes Care 2009 Jul; 32(7):1327-1334
[5] Guide parcours de soins Diabète de type 2 de l'adulte. HAS mars 2014.

CONTACTS

LABEXA Group is a group of medical analysis laboratory centers with a strong regional implantation (N°1 in Nouvelle Aquitaine region, France).
Our 3 subsidiaries EXALAB, LBA and SEALAB are accredited (15189).
EXALAB head office is located near BORDEAUX: 75 rue de la Morandière, 33185 LE HAILLAN
LBA head office is located in CONDOM: 41, boulevard Saint Michel, 31200 CONDOM
SEALAB head office is located in BIARRITZ: 68, avenue de la Marne, 64200 BIARRITZ

For more information contact :
lstankevich@gontardcie.com www.gontardcie.com
jp.galhaud@sealab.fr www.labexa.fr

Thanks to our chief BI, Roman Kuvshinov for extraction and work on big data.

GONTARD & CIE GROUP
More Solutions
GROUPE LABEXA
BIOLOGIE MEDICALE