Prediction of complications of Type 2 Diabetes: The largest European study on AI based prediction on 147.664 patients

Emanuele Frontoni

University of Macerata

emanuele.frontoni@unimc.it

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Motivation

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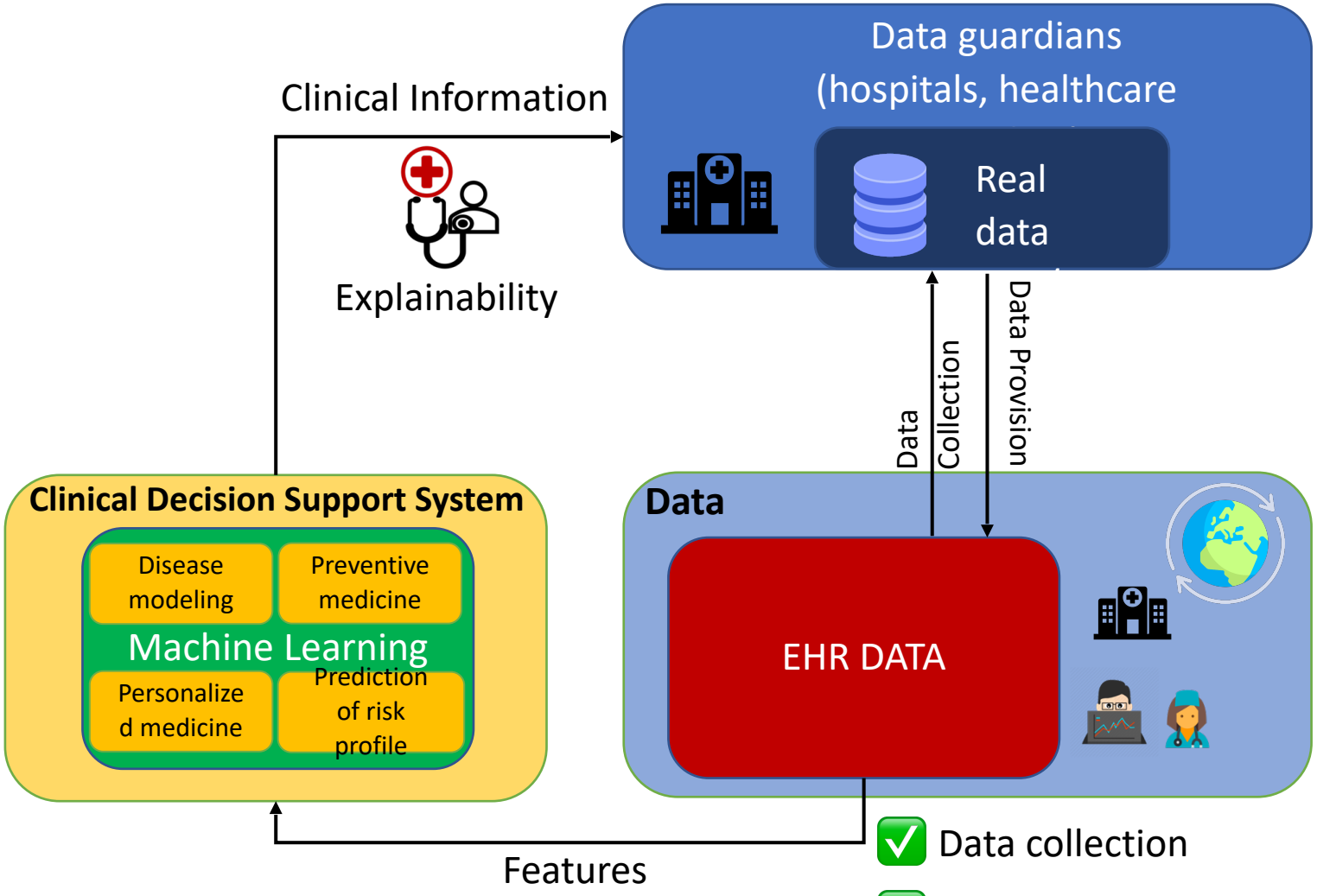
- The management of diabetic complications requires a significant amount of human and economic resources from the national healthcare system (NHS)
- Risk prediction of developing diabetic complications at an early stage plays a key role in appropriate treatment and follow-up of the diabetic patient → Increased quality of care
- Big data in diabetes centers (i.e., high number of patients, high number of characteristics per patient, etc.)

→Integration into electronic health record (EHR) of a Clinical Decision Support System (CDSS) based on Artificial Intelligence (AI) to assist the diabetologist

Clinical Decision Support System



- ✅ Data collection
- ✅ Privacy preserving
- ✅ Personalized medicine

Clinical scenario: Training DB 200K

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Diabetic Complications:

- Retinopathy
- Cer. Vasculopathy
- Per. Vasculopathty
- Cardiopathy
- Nefropathy
- Neuropathy

147.664 Diabetic patients

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Preprocessing: Inclusion/exclusion criteria

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DB training 200K	Total patients	Control pt.	Compl. pt.
Retinopathy	40555	31611	8944
Cer. Vasculopathy	7852	4883	2969
Per. Vasculopathy	9314	7769	1545
Cardiopathy	17849	12305	5544
Nephropathy	30510	22593	7917
Neuropathy	9827	7751	2076

Objective

Risk prediction of developing diabetic chronic complications in individuals who do not yet have them in a 5-year temporal range

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Development of an AI -based clinical decision support system (CDSS) to track morbidity risk profiles

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Integration of the AI -based CDSS into electronic health record (EHR)

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Evaluation of potential cost savings by applying the proposed AI algorithm

External validation DB: Potential cost savings

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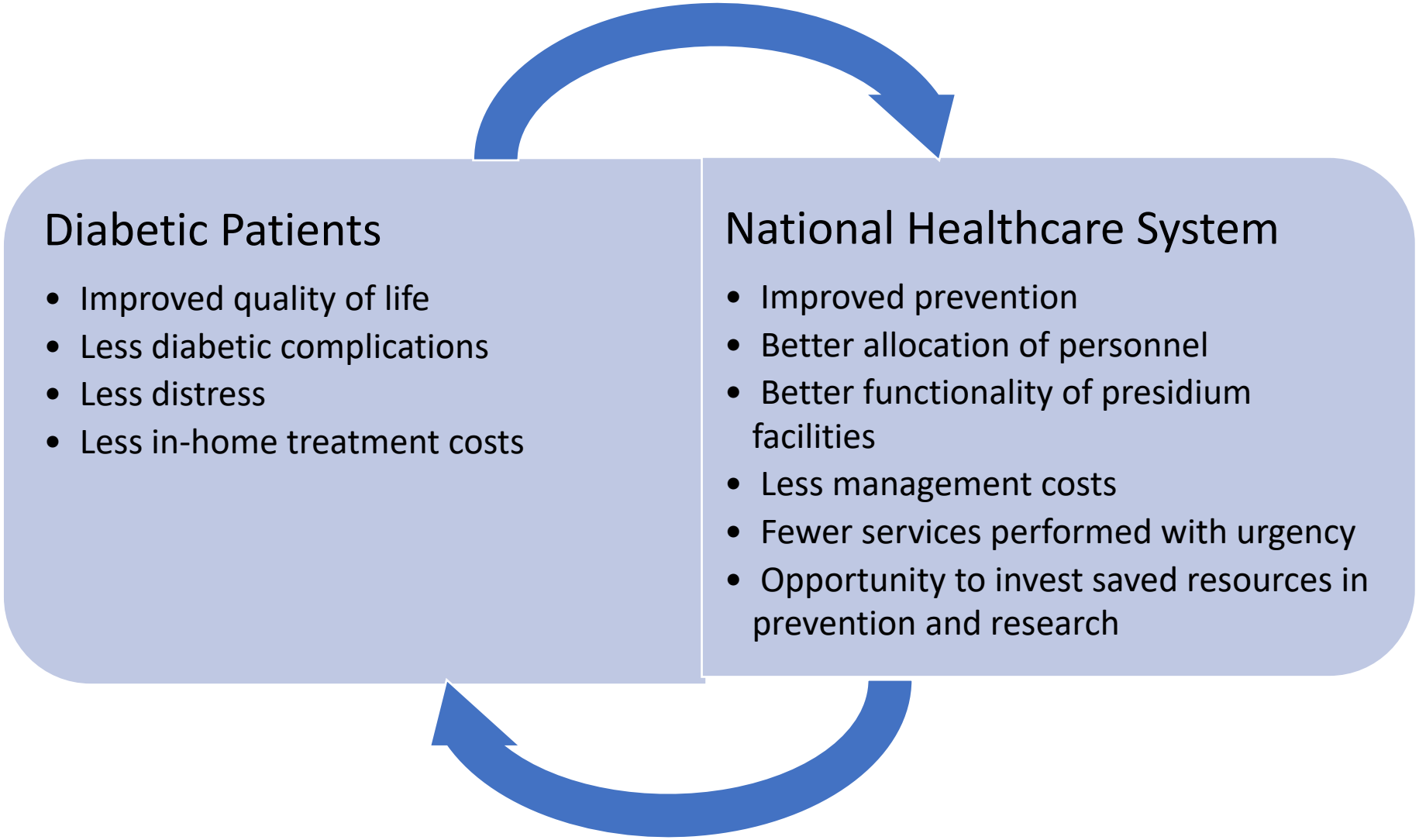
Diabetic complications	Retinopathy	Cardiopathy	Nephropathy	Neuropathy	Cerebral Vasculopathy	Peripherical Vasculopathy	Total
total queryable patients	**7362**	**3311**	**6093**	**196**	**1540**	**3575**	22.077
Patient rate	0,56	0,72	0,38	0,51	0,36	0,2	-
total queryable patients by AI	4123	2384	2315	100	554	715	10.191
Gain	**3.381**	**1.681**	**2.149**	**75**	**400**	**637**	8.322
25%	**845**	**420**	**537**	**19**	**100**	**159**	2.080
50%	**1.690**	**840**	**1.074**	**37**	**200**	**319**	4.161
75%	**2.535**	**1.260**	**1.611**	**56**	**300**	**478**	6.241
Cost per patient	2.000,00 €	2.000,00 €	5.000,00 €	2.000,00 €	3.500,00 €	3.500,00 €	
Potential savings 25%	1.690.315 €	840.332 €	2.685.794 €	37.285 €	350.242 €	557.432 €	6.161.401 €
Potential savings 50%	3.380.630 €	1.680.664 €	5.371.589 €	74.570 €	700.484 €	1.114.864 €	12.322.801 €
Potential savings 75%	5.106.911,03 €	2.510.459,75 €	8.075.166,94 €	112.281,57 €	1.051.755,78 €	1.656.355,80 €	18.512.930,87 €
Potential cost savings (100%)	6.809.214,71 €	3.347.279,66 €	10.766.889,25 €	149.708,76 €	1.402.341,04 €	2.208.474,40 €	24.683.907,83 €

Conclusions



Thank you for the attention

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