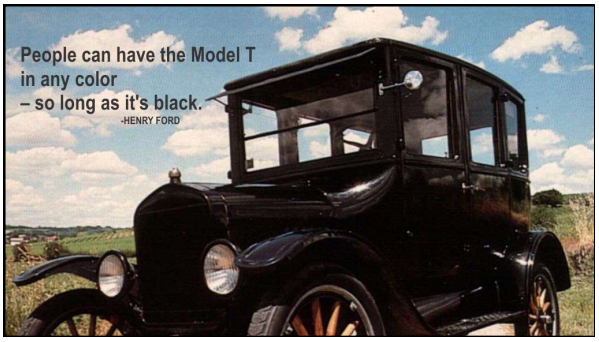
Datagedreven zorg in de praktijk: beslisondersteuning met Watson for Oncology

Big Data in de zorg - Albert Schweitzer Ziekenhuis

Wim Smit

23-11-2017

MRDM



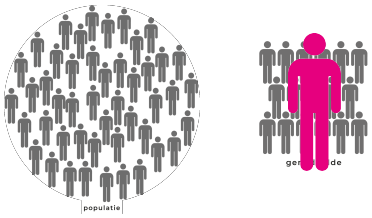
TYPEN MAMMACARCINOOM

120

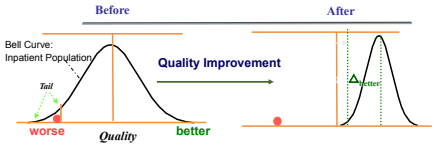
geen standaard richtlijnen

trials worden lastiger

BIG DATA PROFILING

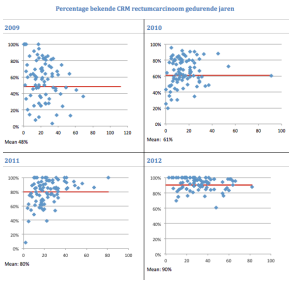


Classic QI model



DICA

Verbeterde kwaliteit colorectale kankerchirurgie



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SOME HIGHLIGHTS

55% lower mortality after gastric cancer surgery

52% lower mortality after colorectal cancer surgery: **200 lives and counting!**

29% fewer re-interventions after colorectal cancer surgery

16% fewer complications after acute aneurysma surgery

30% increase in laparoscopic treatment for colorectal cancer

22% increase complete pathological reporting after breast cancer

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inzicht in darmkankerbehandeling

Zweden: geen chemotherapie

Nederland: wel chemotherapie

Voor bepaald type Nederlandse patiënt (n=800) beter of gelijk resultaat zonder chemo

Effect: NL gestopt voor deze groep, waardoor:

- kwaliteit van leven beter
- lagere kosten

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data

Trusted Third Party databewerking

Value2Health interpretatie

Brightingale beslis-ondersteuning

DICA vergelijken en verbeteren

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SAMMI

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SAMMI

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Predictieve modellen in de literatuur zijn lastig te vertalen naar gebruik in de klinische praktijk

Hazard ratios (95% CI) and model coefficients (standard errors) for prognos

			ER Positive M
Prognostic Factor	Hazard ratio	95% CI	Coefficient
Number Positive Nodes*			
(0, 1, 2 to 4, 5 to 9, 10+)	1.75	1.62 to 1.89	0.56
Tumour Size, mm*			
(<10, 10 to 19, 20 to 29, 30 to 49, 50+)	1.43	1.30 to 1.58	0.36
Tumour Grade*	1.43	1.30 to 1.58	0.36
(Low, Intermediate, High)			
Detection by Screening			
Chemotherapy			
Hormone therapy			

* modeled as ordinal continuous

$$\min_{w,b,\varepsilon} \frac{1}{2}\sum_{p=1}^{d} w_p^2 + \gamma \sum_{i=1}^{n} \varepsilon_i$$

$$\text{subject to} \begin{cases} y_i \left[\sum_{p=1}^{d} w_p x_i^p + b \right] \geq 1 - \varepsilon_i, \forall i = 1, \ldots, n \\ \varepsilon_i \geq 0, \quad \forall i = 1, \ldots, n. \end{cases}$$

Group	N	%	Year 5 deaths* A	Year 5 deaths* P†	Mortality Difference	Year 8 deaths* A	Year 8 deaths* P†	Morta Differ
Total	5,694	100.00	841	890	0.86	1,075	1,082	0.1
Age, years								
<35	111	1.95	28	23	4.5	31	27	3.4
35 to 49	1,172	20.58	150	171	1.79	187	209	1.8
50 to 64	2,630	46.19	270	289	0.72	354	359	0.1
	1,124	19.74	176	191	1.33	227	233	0.5
	657	11.54	217	216	0.15	276	254	3.3
	3,532	62.03	297	350	1.5	408	433	0.7
	2,162	37.97	544	541	0.14	667	649	0.8
	625	10.98	30	39	1.44	41	49	1.2
10 to 19	2,310	40.57	194	222	1.21	267	280	0.5
20 to 29	1,627	28.57	277	283	0.37	363	347	0.9

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Casus

- 45 jarige vrouw met een laesie van 10mm doorsnede in de linkermamma (graad II), 4 positieve lymfeklieren, binnengekomen via het bevolkingsonderzoek, ER+, HER+ Kl67+
- Patient vraagt: wat levert chemotherapie mij op?
- Wie weet het verschil in 5-jaarsoverleving, bij derde generatie chemotherapie (adjuvant), ten opzichte van geen chemotherapie?

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Casus -2

- 45 jarige vrouw met een laesie van 66 mm doorsnede in de linkermamma (graad II), 6 positieve lymfeklieren, binnengekomen via het bevolkingsonderzoek, ER-, HER- Kl67+
- Patient vraagt: wat levert chemotherapie mij op?
- Wie weet het verschil in 5-jaarsoverleving, bij derde generatie chemotherapie (adjuvant), ten opzichte van geen chemotherapie?

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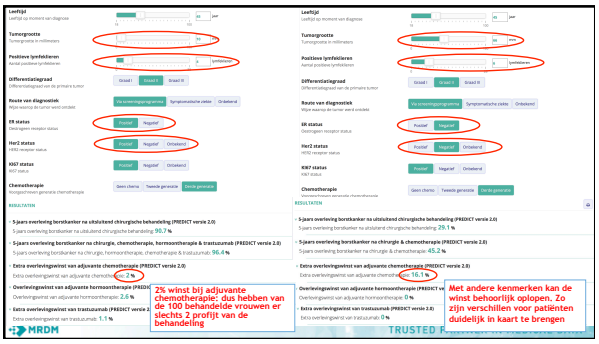
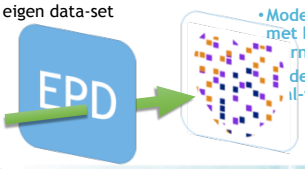


Beschikbaar via app en website

Huidige status

2018

- Modellen invoeren en gebruiken
- Modellen valideren met eigen data-set



- Toegang via EPD
- Voortdurende validatie met klinische data
- Modellen ontwikkelen met behulp van machine ming algoritmes
- dellen op basis van il-world data

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Watson for Oncology

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Intelligence Amplification Watson for Oncology

Jane Smith

Patient

Jane Smith is a 65 year old woman who has been diagnosed with stage IA breast cancer.

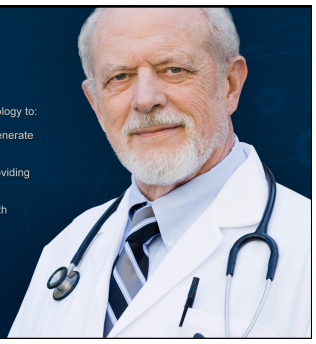
She has an appointment with Dr. Stone to determine her treatment options.

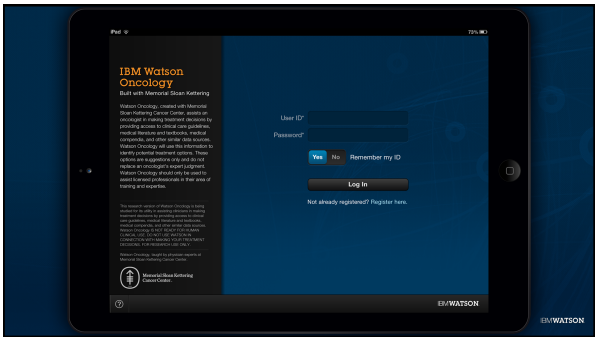
Dr. Dave Stone

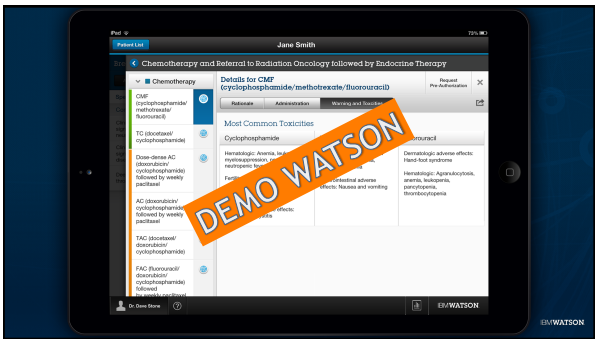
Medical Oncologist

Dr. Dave Stone uses IBM Watson Oncology to:

- Understand Mrs. Smith's case and generate a preliminary view of treatment plans
- Refine the treatment options after providing additional information
- Select a treatment option together with Mrs. Smith







Huidige status

2018

- Getraind door MSKCC op basis van Amerikaanse richtlijnen
- Ranking gebaseerd op training
- NLP voor het vinden van ondersteunend bewijs
- Selectie van belangijke argumenten met NLP

- Getraind met Europese data & richtlijnen
- Ranking op basis van training & literatuur
- NLP voor het genereren van casus specifieke rapportage van relevante wetenschappelijke data & publicaties
- Shared decision making

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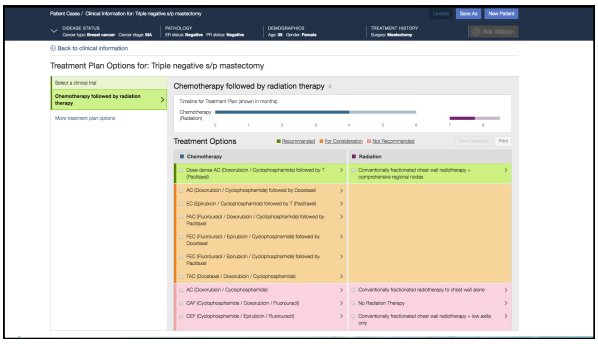

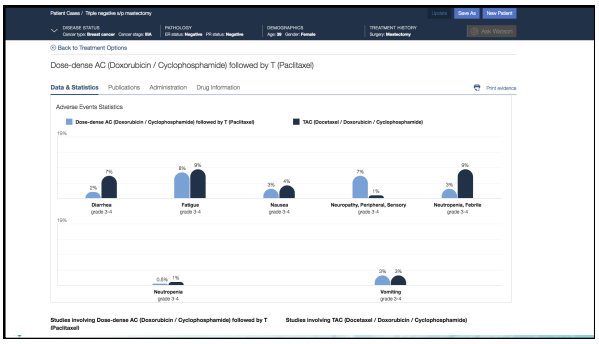

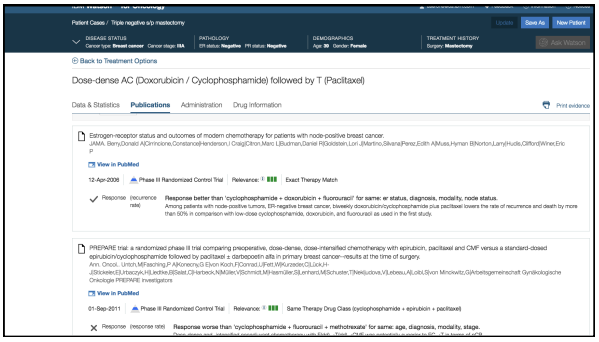
Patient Cases / Triple negative s/p mastectomy
Update
Save As
New Patient
DISEASE STATUS
Cancer type: Breast cancer Cancer stage: IIIA
PATHOLOGY
ER status: Negative PR status: Negative
DEMOGRAPHICS
Age: 39 Gender: Female
TREATMENT HISTORY
Surgery: Mastectomy
Ask Watson
Back to Treatment Options
Dose-dense AC (Doxorubicin / Cyclophosphamide) followed by T (Paclitaxel)
Data & Statistics
Publications
Administration
Drug Information
Print evidence
Estrogen-receptor status and outcomes of modern chemotherapy for patients with node-positive breast cancer.
View in PubMed
12-Apr-2006
Phase III Randomized Control Trial
Relevance:
Exact Therapy Match
Response (recurrence rate)
Response better than 'cyclophosphamide + doxorubicin + fluorouracil' for same: er status, diagnosis, modality, node status.
Among patients with node-positive tumors, ER-negative breast cancer, biweekly doxorubicin/cyclophosphamide plus paclitaxel lowers the rate of recurrence and death by more than 50% in comparison with low-dose cyclophosphamide, doxorubicin, and fluorouracil as used in the first study.
PREPARE trial: a randomized phase III trial comparing preoperative, dose-dense, dose-intensified chemotherapy with epirubicin, paclitaxel and CMF versus a standard-dosed epirubicin/cyclophosphamide followed by paclitaxel ± darbepoetin alfa in primary breast cancer--results at the time of surgery.
View in PubMed
01-Sep-2011
Phase III Randomized Control Trial
Relevance:
Same Therapy Drug Class (cyclophosphamide + epirubicin + paclitaxel)
Response (response rate)
Response worse than 'cyclophosphamide + fluorouracil + methotrexate' for same: age, diagnosis, modality, stage.

Datagedreven zorg is dichterbij dan u denkt!
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