Validation and implementation of a mobile app decision support system for quality assurance of tumor boards. Analyzing the concordance rates for prostate cancer at a multidisciplinary board of a Tertiary Referral Centre.

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Background

Certified Cancer Centers are instructed to present 100% of all cases at multidisciplinary tumor boards (MTD). Since time is not unlimited, discussion of standard cases can be at the disadvantage of complicated cases. In any case, this leads to high quantity tumor boards, but what about high quality? [1-3] A validated expert-curated decision support system (DSS) could enable to avoid discussion of standard cases in MTD and provide sufficient time for demanding cases.

Therefore, we developed an expert-curated, algorithm-based smartphone application. This approach offers some significant advantages, which have been well described in Nature Biotechnology in 2018.[4]

The purpose of this study is to compare the decision concordance rates of an experienced MDT with this smartphone application developed by medical specialists.

Patient characteristics

Cases analyzed		1924
Age±SD, years		68±9
Stage, n(%)	I	244 (13)
	II	541 (28)
	III	261 (14)
	IV	822 (43)
	N/A	56
PSA-Level ng/ml, n (%)	≤10	1025 (53)
	10-20	403 (21)
	20-50	217 (11)
	50-100	125 (7)
	≥100	154 (8)
risk stratification n (%)	good prognosis	357 (19)
	intermediate prognosis	400 (21)
	poor prognosis	1113 (58)
	N/A	54
Gleason Score n(%)	5	8 (0,4)
	6	359 (19)
	7a	390 (20)
	7b	272 (14)
	8	291 (15)
	9	345 (18)
	10	54 (3)
	N/A	205

Table 1: patient characteristics

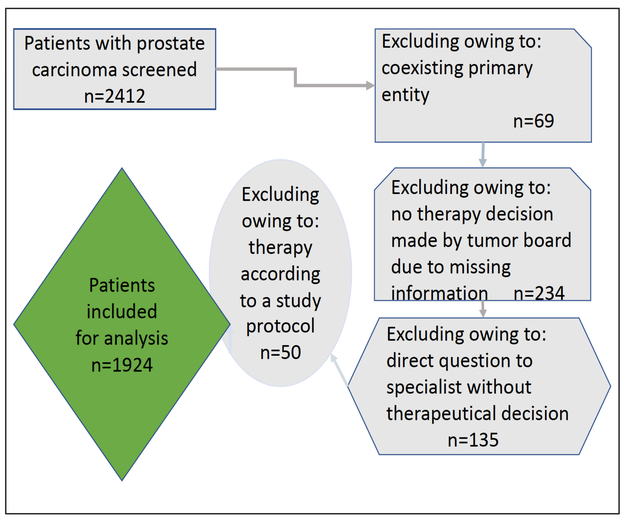

Figure 1 flow chart patient cohort with prostate cancer

Methods

1. random samples of an equal number of patient cases per year from our database with testicular carcinoma, who were discussed in the MDT 2014-2018.
2. Each question discussed in the Tumour Board was answered, if possible, with the use of the smartphone application.
3. Independent reviewers then compared the recommendations of the MDT with those of the application, the source of the respective answers was not visible.
4. Analysis of concordance rate, descriptive statistics and data analysis: IBM´s statistics software SPSS Version 25 Correlation analysis of cancer case characteristics: Kendalls Tau, Gamma, Pearson and Spearman tests

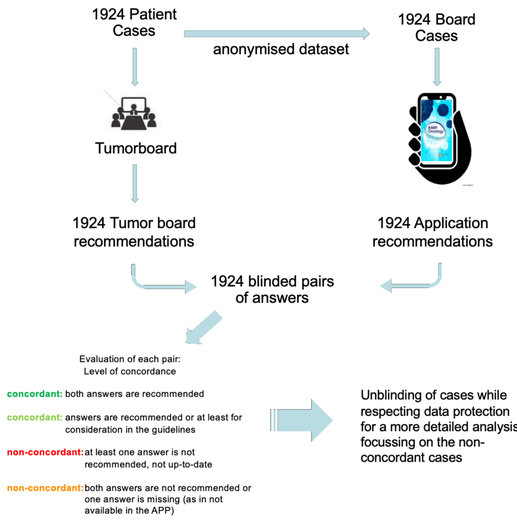

Figure 2 Evaluation of concordance

Results I

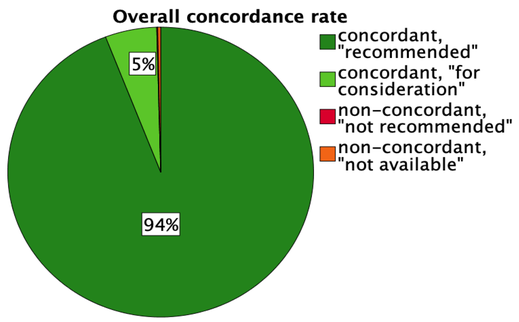

Figure 3 overall treatment concordance between the multidisciplinary tumorboard and the application "EasyOncology"

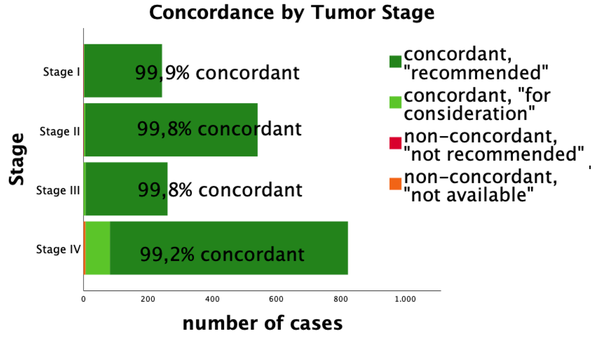

Figure 4 concordance by tumor stage (prostate carcinoma)

Results II

Overall concordance rate was 99.6% (1918/1924), including 94.1% ID and 5.5% CAD.

Stage specific concordance rates were 99.6% (stage I), 99.8% (stage II), 100% (stage III), and 99.3% (stage IV).

Quality of concordance were independent of age, risk profile or line of treatment.

Conclusion

The reliability of any DSS is required to be 100% when dealing with precision oncology. Our expert-curated DSS provides nearly 100% concordance with a specialized MTD. Despite these good results and superiority to other DSS reported so far, we aim for a next generation solution with mutual quality control on both sides: human being and machine and vice versa. After approval as a medical device according to MDR, the software is undergoing prospective validation.

The application provides relevant support for clinicians and ensures therapy according to best clinical practice, therewith increasing patient safety.

References:

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[4] Making the right calls in precision oncology. Bungartz KD, et al. *Nat Biotechnol* 2018. 36:692-6