

Equivalence of Paper and Electronic Administration of Patient-Reported Outcomes: A Comparison in Psoriatic Arthritis



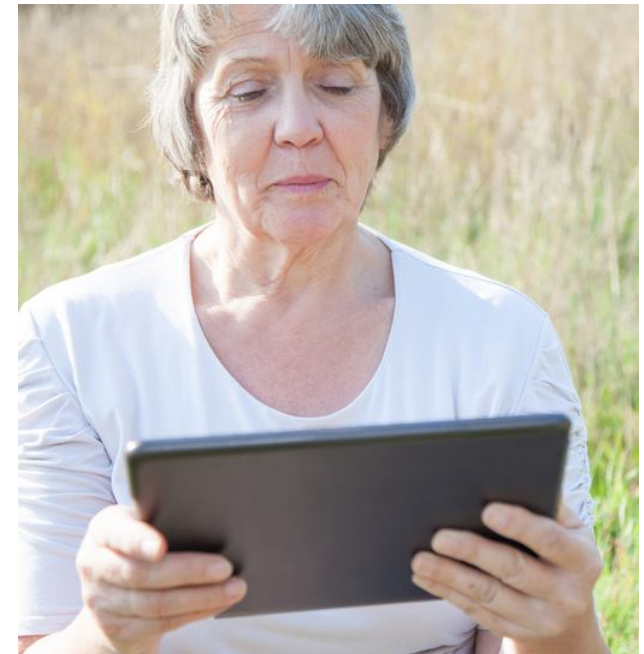
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Migration of Questionnaires to Electronic Format

- Electronic patient reported outcomes (ePRO) increasingly used in clinical research
- Where instrument has been validated in paper format, ePRO version should be equivalent to paper
- Some changes generally needed in migration
 - Tap rather than tick or circle response
 - Number of questions per screen/page
 - Vertical or horizontal layout of response options
- Could the changes affect responses?



Background



Guidance for Industry Patient-Reported Outcome Measures: Use in Medical Product Development to Support Labeling Claims

U.S. Department of Health and Human Services
Food and Drug Administration
Center for Drug Evaluation and Research (CDER)
Center for Biologics Evaluation and Research (CBER)
Center for Devices and Radiological Health (CDRH)

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Clinical/Medical

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“When a PRO instrument is modified, sponsors generally should provide evidence to confirm the new instrument’s adequacy.



Examples of changes that can alter the way that patients respond to the same set of questions include [...] Changing an instrument from paper to electronic format

Background

Table 1 PRO to ePRO measurement equivalence: Instrument modification and supporting evidence

Level of modification	Rationale	Examples	Level of evidence
Minor	The modification can be justified on the basis of logic and/or existing literature. No change in content or meaning.	<ol style="list-style-type: none"> 1) Nonsubstantive changes in instructions (e.g., from circling the response to touching the response on a screen). 2) Minor changes in format (e.g., one item per screen rather than multiple items on a page). 	Cognitive debriefing Usability testing
Moderate	Based on the current empirical literature, the modification cannot be justified as minor. May change content or meaning.	<ol style="list-style-type: none"> 1) Changes in item wording or more significant changes in presentation that might alter interpretability. 2) Change in mode of administration involving different cognitive processes (e.g., paper [visual] to IVR [aural]). 	Equivalence testing Usability testing
Substantial	There is no existing empirical support for the equivalence of the modification and the modification clearly changes content or meaning	<ol style="list-style-type: none"> 1) Substantial changes in item response options 2) Substantial changes in item wording 	Full psychometric testing Usability testing

Adapted from Shields et al. [62].

Coons SJ, Gwaltney CJ, Hays RD, et al. Recommendations on Evidence Needed to Support Measurement Equivalence between Electronic and Paper-based Patient-Reported Outcome (PRO) Measures: ISPOR ePRO Good Research Practices Task Force Report. 2008.

Assessment of Psoriatic Arthritis (PsA)

- PsA is a type of inflammatory arthritis, common in patients with psoriasis
- Seven scales selected to be used on electronic tablet
 - SF-36v2 Health Survey
 - Bath Ankylosing Spondylitis Disease Activity Index (BASDAI)
 - Health Assessment Questionnaire (HAQDI)
 - Dermatology Quality of Life Instrument (DLQI)
 - Patient Global Assessment of Disease Activity (PGAD)
 - Subject Assessment of Pain (SAP)
 - Fatigue VAS
- Cognitive interviews with 24 PsA patients confirmed that patients interpreted scales in the same way for paper and ePRO



Equivalence Study: Objectives

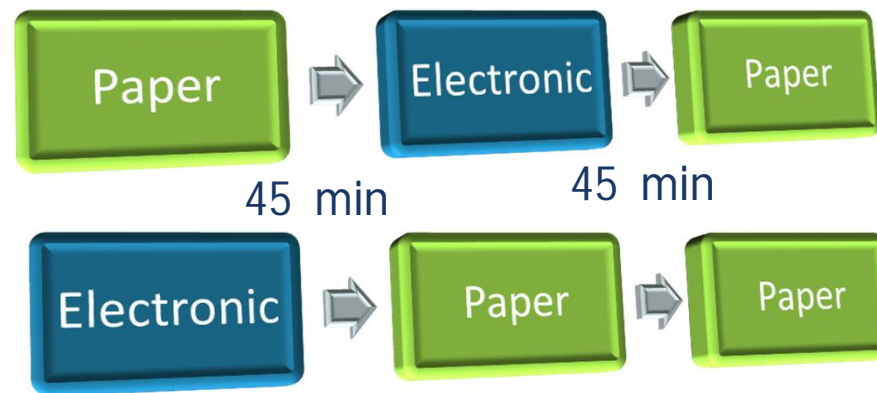
- 1) To assess equivalence of scores obtained by paper and electronic tablet administration of the PRO measures;
- 2) To assess the test-retest reliability of paper administration of the PRO measures (in order to provide a reference value for comparison of the paper to electronic reliability).
- 3) To determine subjects' opinions about the ease of use, acceptability, and preferences relating to the electronic tablet versions of the PRO measures;

Equivalence Study: Method

- Prospective, non-interventional, randomized crossover study
- N=53 adult PsA patients
 - 34 female, 19 male
 - Mean age (SD) = 55.6 years (14.9)
- Sampled from 4 clinical sites in the US

Equivalence Study: Design

- Three-period within-subjects crossover design
- Study conducted in single half-day session



Post Assessment Survey:
Ease of use, acceptability,
preference for, and any
difficulties experienced
using paper or eTablet.

- Randomized order of instrument presentation
 - Same order used for given patient for all three periods
 - Order randomized between patients

Analyses

- Correlational approach using Intraclass Correlation Coefficient (ICC)
 - ICC preferred to Spearman's r
 - Value from 0 (no agreement) to 1 (perfect agreement)
 - Value > 0.70 indicates good correspondence (Lohr et al., 1996)
 - Agreement measured between paper and ePRO scores
 - Test-retest reliability obtained for the two administrations using paper
- Numerical agreement approach
 - Mean score differences were examined by mode
 - Bland-Altman plots calculated
- Descriptive statistics summarized ease of use, acceptability, and preferences.

Results : ICC Paper vs ePRO

- ICC values for SF-36v2 measures ranged from 0.75 to 0.97.
- ICC values for multi-item questionnaires, BASDAI, DLQI and HAQDI, were all > 0.9
- ICC values for single-item VAS measures ranged from 0.80 to 0.93.

**All ICCs above target value of 0.70,
indicating good to excellent agreement**

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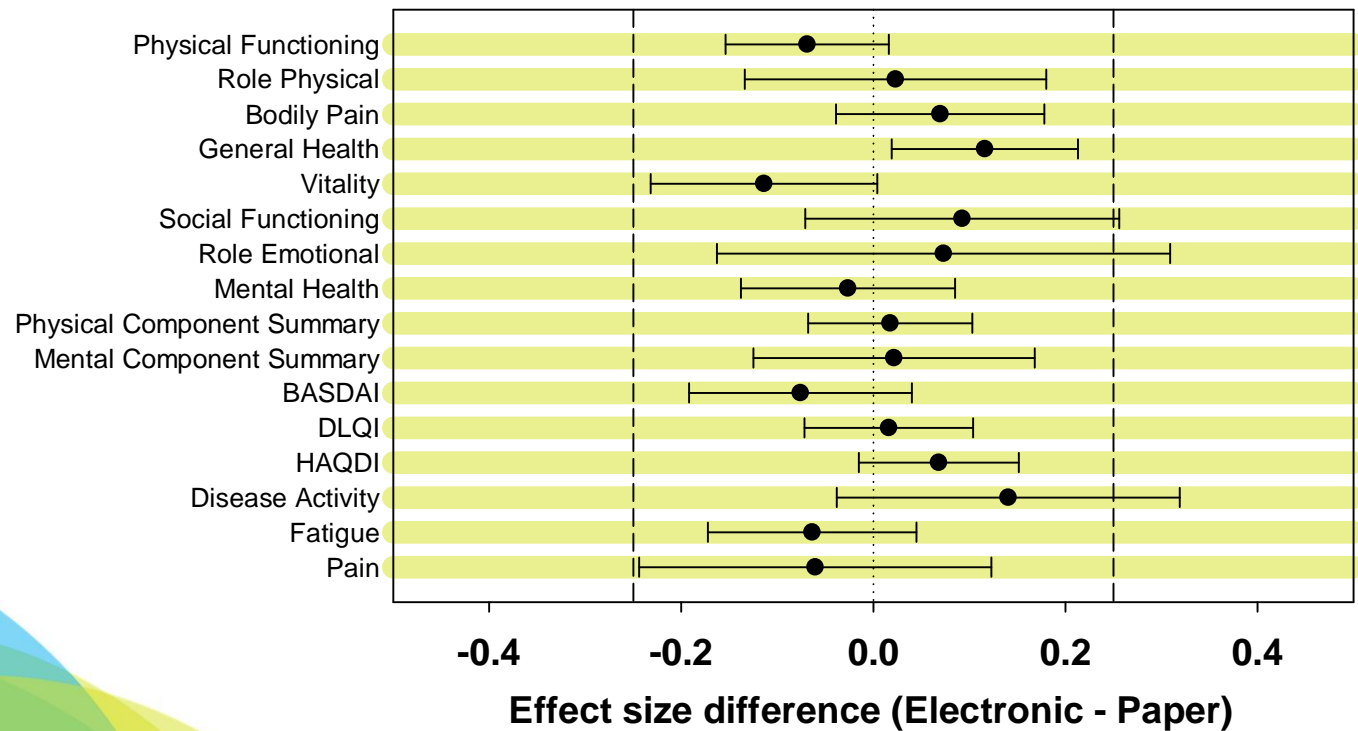
Results : ICC Comparison to Paper-Paper reliability

Scales sorted by value of *Paper-ePRO* ICC

Instrument	<i>Paper-ePRO</i>	Paper-paper	
SF-36 Physical Functioning	0.97	0.97	
SF-36 Physical Component Summary	0.95	0.96	
DLQI	0.95	0.96	
HAQDI	0.95	0.97	0.95-1.00
SF-36 General Health	0.94	0.95	
SF-36 Mental Health	0.94	0.95	
Fatigue	0.93	0.93	
BASDAI	0.92	0.94	
SF-36 Vitality	0.91	0.88	
SF-36 Bodily Pain	0.9	0.91	0.85-0.94
SF-36 Mental Component Summary	0.9	0.94	
SF-36 Social Functioning	0.87	0.85	
SF-36 Role Physical	0.84	0.9	
Pain	0.81	0.83	0.75-0.84
Disease Activity	0.8	0.92	
SF-36 Role Emotional	0.75	0.85	
Mean	0.90	0.92	



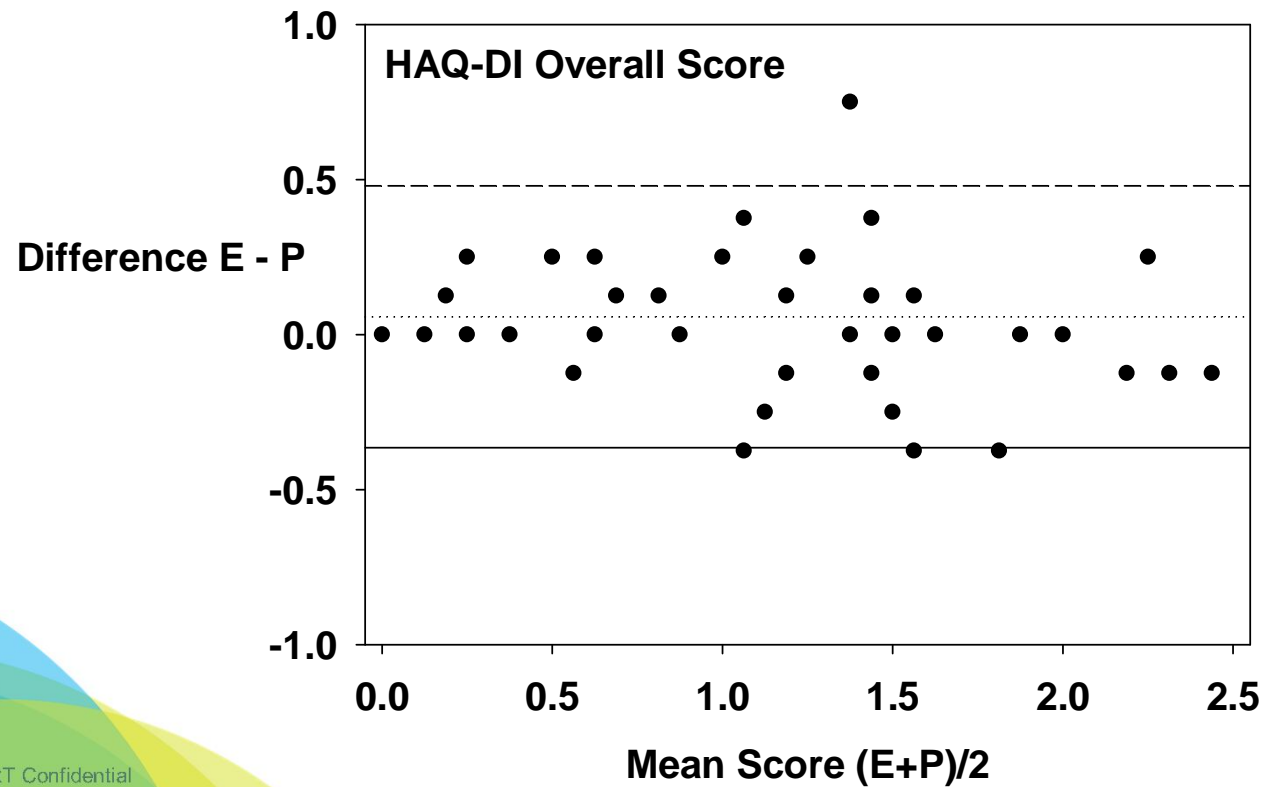
Results : Agreement Between Measures



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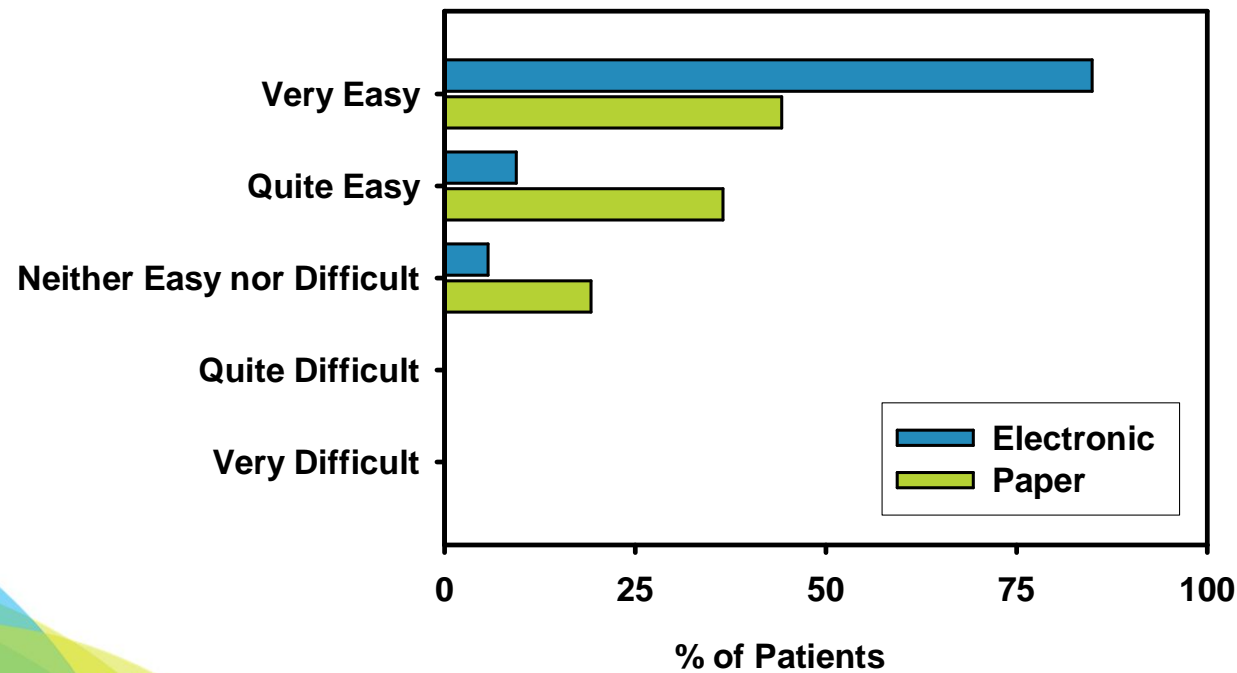


Results: Bland-Altman Plot



Results: Post-Assessment Survey

How easy or difficult did you find using the electronic tablet/paper questionnaires in the study?



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Results: Post-Assessment Survey

	Electronic	No Preference	Paper
Which type of questionnaire did you prefer using?	37 (74.0%)	12 (24.0%)	1 (2.0%)

	Yes	No
Did you find <u>the electronic tablet</u> acceptable to use?	52 (98.1%)	1 (1.9%)
Did you find the <u>paper questionnaires</u> acceptable to use?	50 (96.2%)	2 (3.8%)

Sample Quotes: Electronic Tablet

- *It's easier, faster, comfortable.*
- *I think everyone should use one; it's very easy to use.*
- *Much easier than the paper to use.*
- *It's probably easier for everybody. It was simple to use and easier for saving files.*
- *The lighting overhead caused glares on the screen, which makes it little hard to read.*
- *The only problem was the glare, so I had to move the device several times.*
- *Stylus was sometimes sluggish.*

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Sample Quotes: Paper

- *Discomfort in hands at times with pen.*
- *Found it harder to remember the question and to understand them even though they are much the same. I'm used to the electronics.*
- *My handwriting is not as good and my hand was getting tired due to the arthritis and little painful and stiff.*
- *Reading papers make my eyes tired after awhile.*
- *Holding pen becomes difficult over time.*

Summary and Conclusions

- PRO scores are equivalent when administered to PsA patients via ePRO (electronic tablet) and paper modes.
 - ICCs show good equivalence, comparable to test-retest reliability
 - Mean scores closely similar between modes
 - Bland-Altman plots well-behaved
- PROs administered on electronic tablet were found by patients to be:
 - easy to use,
 - acceptable,
 - preferred over paper-based measures.



THANK YOU

Acknowledgement: Thanks to Evo Alemao of Bristol-Myers Squibb for his assistance in this work

Examples of differences in paper & electronic versions: DLQI

The aim of this questionnaire is to measure how much your skin problem has affected your life OVER THE LAST WEEK. Please check one box for each question.

1.	Over the last week, how itchy, sore, painful or stinging has your skin been?	Very much A lot A little Not at all	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
2.	Over the last week, how embarrassed or self conscious have you been because of your skin?	Very much A lot A little Not at all	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
3.	Over the last week, how much has your skin interfered with you going shopping or looking after your home or yard?	Very much A lot A little Not at all	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Not relevant <input type="checkbox"/>

The aim of this questionnaire is to measure how much your skin problem has affected your life OVER THE LAST WEEK. Please tap one box for each question.

Tap -->.

3. Over the last week, how much has your skin interfered with you going shopping or looking after your home or yard?

Very much

A lot

A little

Not at all Not relevant

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Examples of differences in paper & electronic versions: HAQ

Please check the response which best describes your usual abilities OVER THE PAST WEEK:

DRESSING & GROOMING

Are you able to:

- Dress yourself, including tying shoelaces and doing buttons?
- Shampoo your hair?

	Without ANY Difficulty	With SOME Difficulty	With MUCH Difficulty	UNABLE To Do
- Dress yourself, including tying shoelaces and doing buttons?	---	---	---	---
- Shampoo your hair?	---	---	---	---

Please select the response which best describes your usual abilities OVER THE PAST WEEK:

DRESSING & GROOMING

Are you able to:

- Dress yourself, including tying shoelaces and doing buttons?

Without ANY Difficulty

With SOME Difficulty

With MUCH Difficulty

UNABLE To Do

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Please select the response which best describes your usual abilities OVER THE PAST WEEK:

DRESSING & GROOMING

Are you able to:

- Shampoo your hair?

Without ANY Difficulty

With SOME Difficulty

With MUCH Difficulty

UNABLE To Do

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Examples of differences in paper & electronic versions: SAP

SUBJECT'S ASSESSMENT OF PAIN

HOW MUCH PAIN HAVE YOU HAD BECAUSE OF YOUR CONDITION OVER THE PAST WEEK?
PLACE A VERTICAL LINE BELOW TO INDICATE HOW SEVERE YOUR PAIN HAS BEEN:

No pain

Pain as
bad as it
could be

Subject Assessment of Pain

How much pain have you had because of your condition over the past week? Place a mark on the line below to indicate how severe your pain has been:

No Pain Pain as bad as it could be

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