

TOWARDS OBJECTIVE HAND SIZE ASSESSMENT AND A STANDARDIZED MEASUREMENT TECHNIQUE

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INTRODUCTION

Accurate anatomical measurement of human hands in challenging
 Hand size can be an important proxy, but not a regular clinical demand
 Existing studies come from plastic surgery and burn treatment, to estimate the burned skin surface
 Hand size affects hand disinfection quality
 WHO hand hygiene guideline recommends hand rub volume depending on the hand size
 Hand surface estimation is not routinely used in hand hygiene related investigations
 Traditional methods were time-consuming and human-resource-intensive

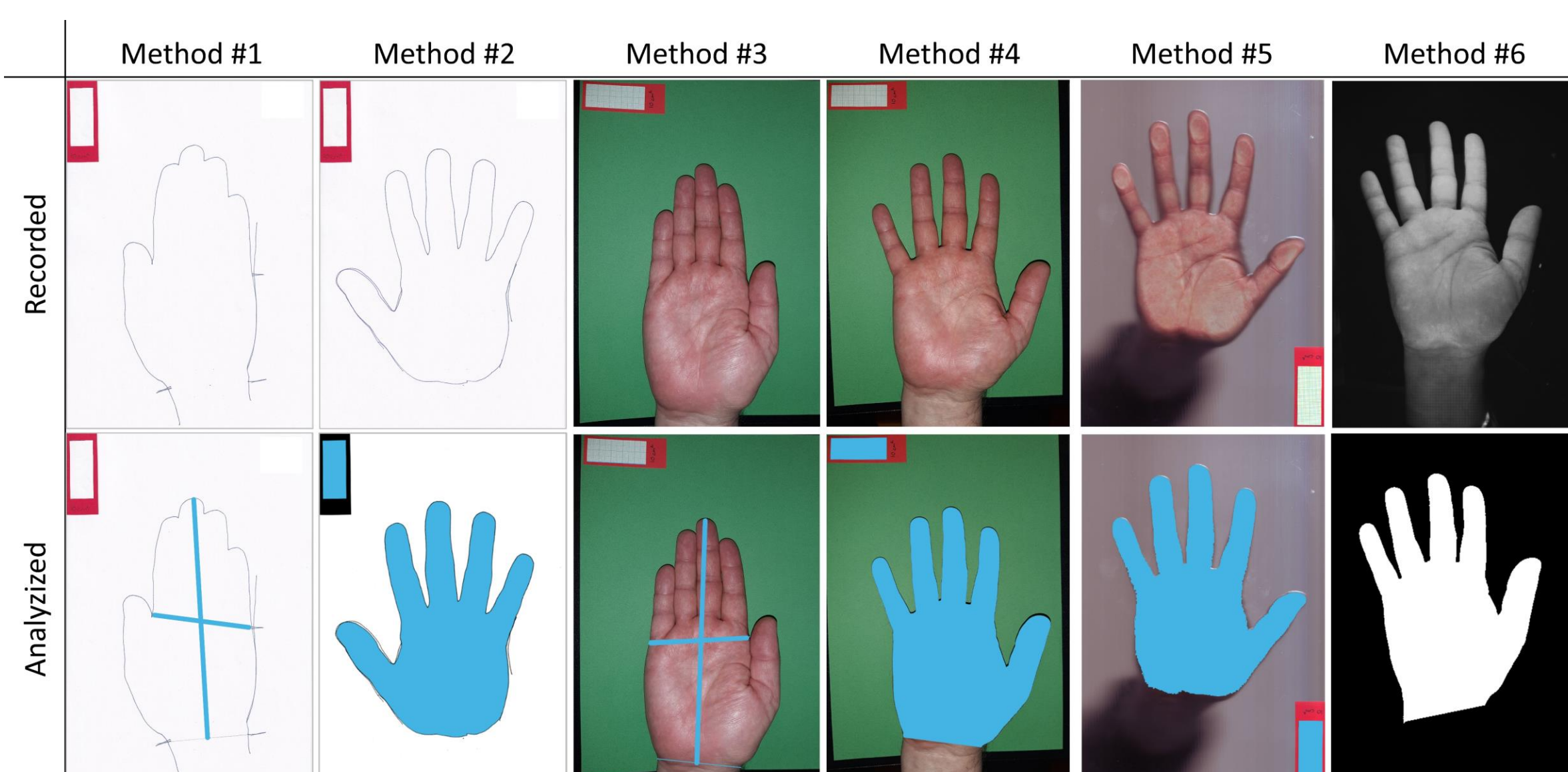
AIM

Compare different measurement methods to assess hand size and surface
 Validate hand size measurements derived from an automated hand hygiene control device

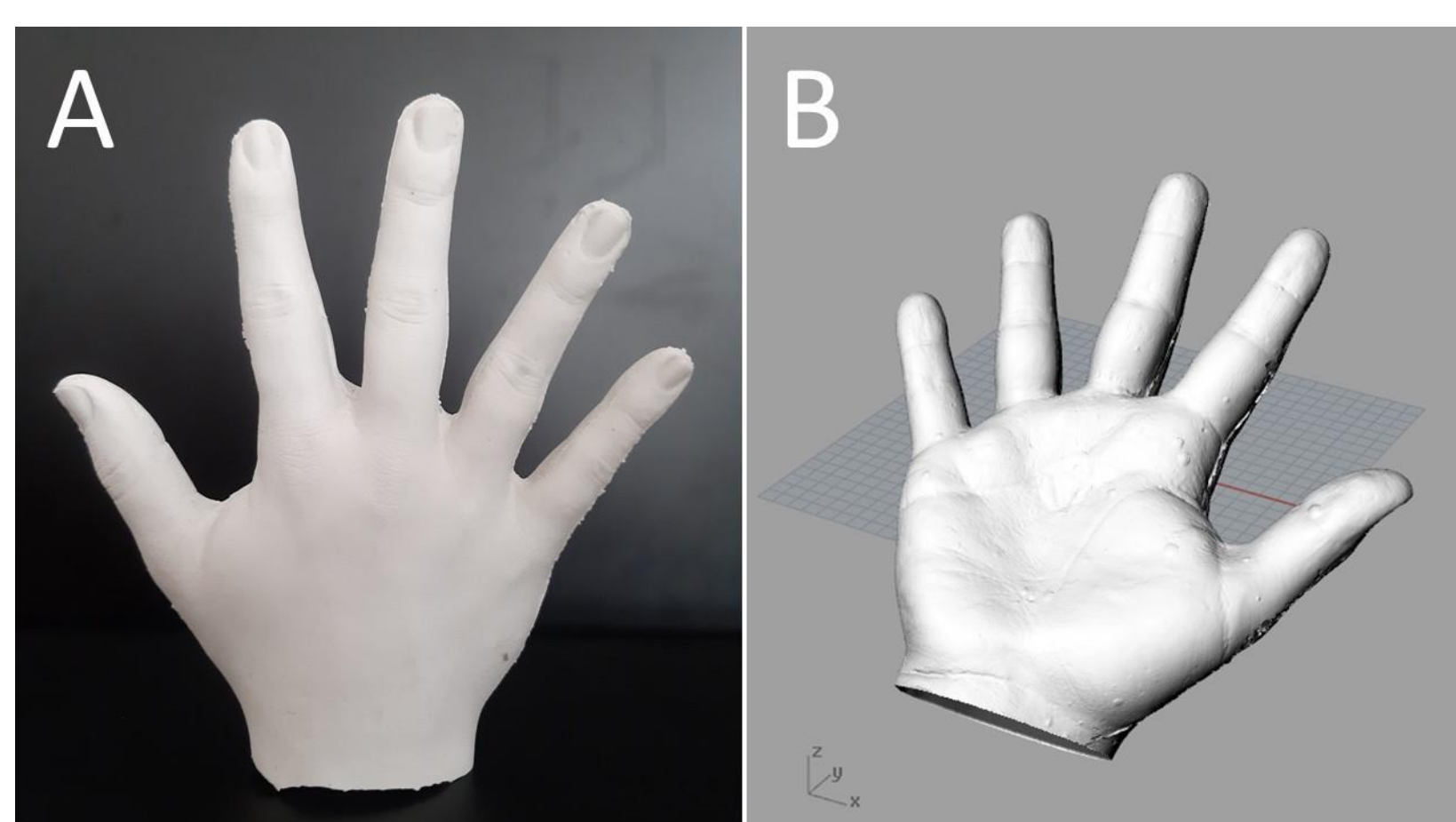
METHODS

Adult hands were measured with 6 different methods identified from the literature

Graphical illustration of the methods:

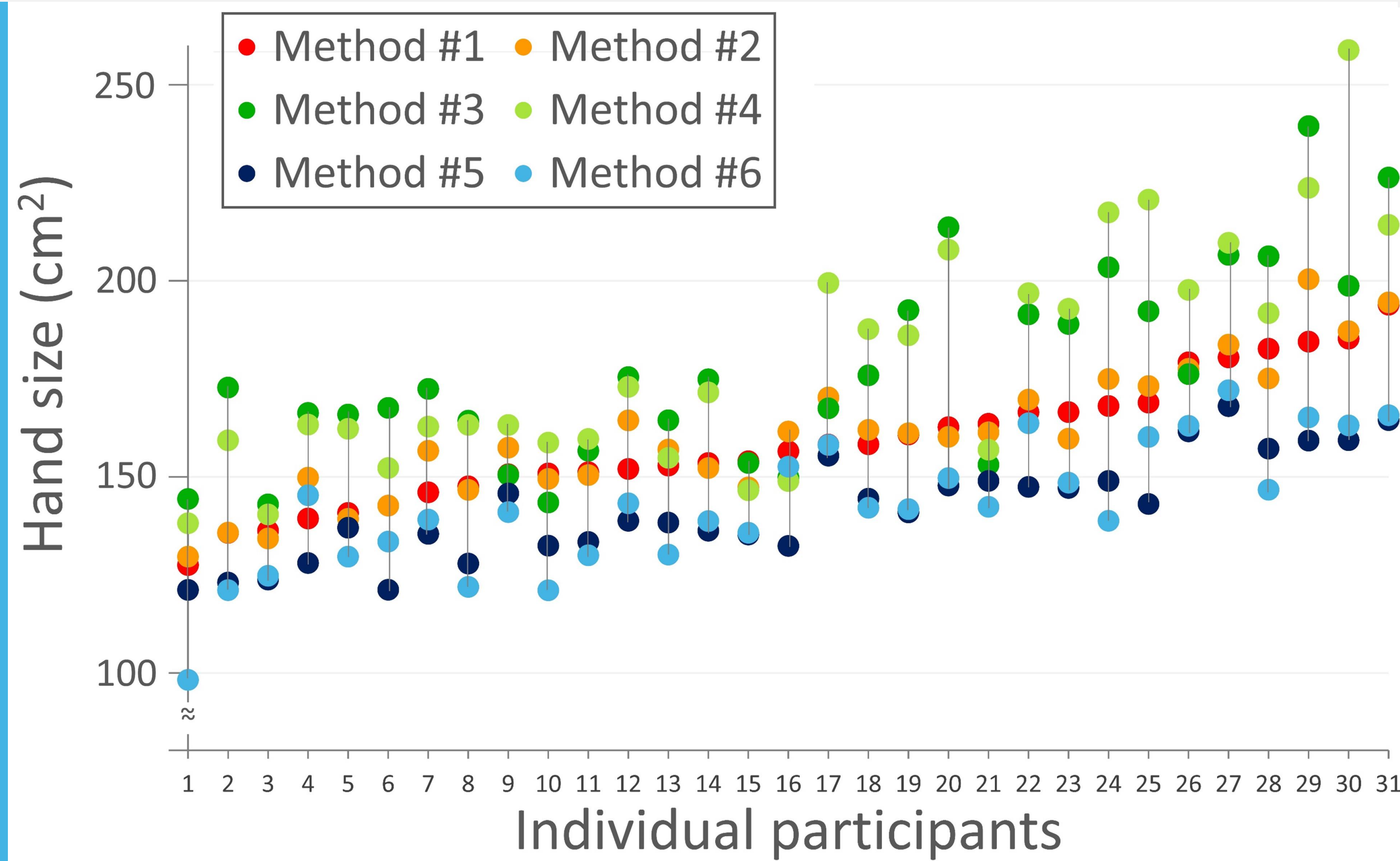


All methods measure only a 2D projection of the hand, introducing a systematic distortion
 An artificial, reference hand model was created
 Silicone hand was molded. Its surface was objectively computed, then projected to the estimations of the 2D methods



A) While silicone reference hand molded
 B) 3D model constructed by a 3D laser scanner

RESULTS



31 healthy, adult participants (9 man and 22 women) were involved on a voluntary basis

The surface of the 3D hand model was computed at 409.7 cm². Based on the ratio of the measured 2D-based hand size and the 3D hand surface, a correction factor was determined for generic use:

	Size of 1 hand side (cm ²)	Size of 2 hand sides (cm ²)	Suggested correction factor
Method #2	163.3	326.7	1.254
Method #4	204.0	407.9	1.004
Method #5	147.4	294.8	1.390
Method #6	150.6	301.2	1.360
Real hands surface based on 3D modeling (cm ²)	409.7		

Method #1 and #2 require app. the same correction factor
 Method #3 and #4 require app. the same correction factor

CONCLUSION

Using the empirically established correction factor, result from different studies employing Methods #1–6 became comparable

Hand size determination by the digital control device proved to be consistent (M #6), therefore individualized hand hygiene-focused investigations and trainings can be conducted in the future



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