28th ECSS Anniversary Congress, Paris/France, 4-7 July 2023

An Analysis of Key Performance Indicators during 50 and 100 meter Swim Lengths across Four Swim Strokes

Bozyigit, G., Ozuak, A., Patterson, J., Lockwood, K.

Brock University

INTRODUCTION:
Key performance indicators (KPI's) are skill-based metrics used by coaches and athletes to adjust technique, track training, develop race strategies and predict performance times. The purpose of the study was to investigate the effect of swim-specific KPI's [stroke count (SC;#), stroke length (SL;cm), stroke rate (SR;#/s), and kick frequency (KF;#/s)] on total swim time (s) during 50m and 100m swim lengths across four swim strokes [butterfly, backstroke, breaststroke, and freestyle].
METHODS:
Varsity-caliber competitive swimmers (n=12 males; 20yrs) were recruited. Anthropometric measures including height (182.1cm), seated height (146cm), leg length (98.3cm), wingspan (191.1cm), hand length (20cm) and weight (80.2kg) were recorded. Shoulder and ankle range of motion (ROM) measurements were obtained, and a Y-balance test was conducted to profile the athlete's upper and lower limb mobility. Athletes completed four swim sessions consisting of a standardized warm up, 50m kick, 50m pull, 50m swim and 100m swim distances per stroke. KPI data was collected using a portable device (TritonWear, ON, Canada) secured inside the athletes' swim cap. TritonWear measures SC(#), SL(cm), SR(#/s) and total swim time (s). A GoPro Hero 6 (GoPro, California, USA) collected underwater video to facilitate calculating KF(#/s).
RESULTS:
Descriptives were calculated for all anthropometric, ROM and KPI variables across the two swim lengths and four swim strokes. Pearson product-moment correlations revealed significant relations between anthropometric measures and select KPI's; and between ROM measures and select KPI's ($p<0.05$) suggesting that both anthropometrics and ROM have the potential to influence swim technique and race strategies. A series of repeated-measures ANOVA's with Greenhouse-Geisser corrections revealed significant differences in select KPI's (SC, SL and KF) during the execution of 50m and 100m swim lengths across all of the four strokes ($p<0.05$), suggesting the technique employed by specific strokes had the potential to influence the KPI's per stroke. A series of repeated-measures ANOVA's with Greenhouse-Geisser corrections also revealed significant differences in select KPI's (SR, SL, KF) during the execution of 50m versus 100m swim lengths using butterfly, backstroke, breaststroke, and freestyle strokes ($p<0.05$), suggesting that swim length utilizes different KPI related strategies for strokes.
CONCLUSION:
Data-driven metrics obtained from portable instrumentation during swim performances facilitated understanding the relationship between anthropometrics, ROM and KPI's and how to adjust select KPI's relative to an athlete's anthropometrics, technique and race strategy across four different swim strokes and two swim lengths. These sport specific skill-based metrics can empower coaches and athletes to use KPI's to optimize athlete potential and target performance goals.

Topic: **Biomechanics**

Presentation **E-poster**

European Database of Sport Science (EDSS)

Supported by SporTools GmbH

35035