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Diminishing Returns on Increased Dried Blood Spot Sample Quantity

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Background

Self-collected dried blood spot (DBS) specimens have been used in several studies to determine or confirm HIV status, but utility may be limited by insufficient samples. We examined differences in sample quality and adequacy for HIV testing when using a 1-, 3- or 5-spot DBS specimen collection card.

Methods

In 2014, 45 men who have sex with men were recruited and 15 men each were randomized to receive a 1-, 3- or 5-spot DBS collection card. Each spot on the card holds 75-80 µl of sample. Written instructions with instructional pictures were provided on how to collect the specimen(s). DBS cards were then dried, packaged with desiccant and humidity indicators, and sent to a Centers for Disease Control and Prevention lab for independent review. The DBS cards were reviewed and rated on overall quality (bad, fair or good) and on adequacy (whether a complete series of serological testing could be conducted [screen + repeat + supplemental test]). Adequacy for HIV testing was determined by the number of completely filled spots, number of punches obtained from each spot, and smearing and dabbing.

Results

t-test Results Comparing Punches by Number of Dried Blood Spots in Card

Number of Spots	N	Mean	SD	1 Spot	3 Spots	5 Spots
1 Spot	15	2.33	1.21	-	5.00*	3.96*
3 Spots	15	6.60	3.11	-	-	0.73
5 Spots	15	7.73	5.16	-	-	-

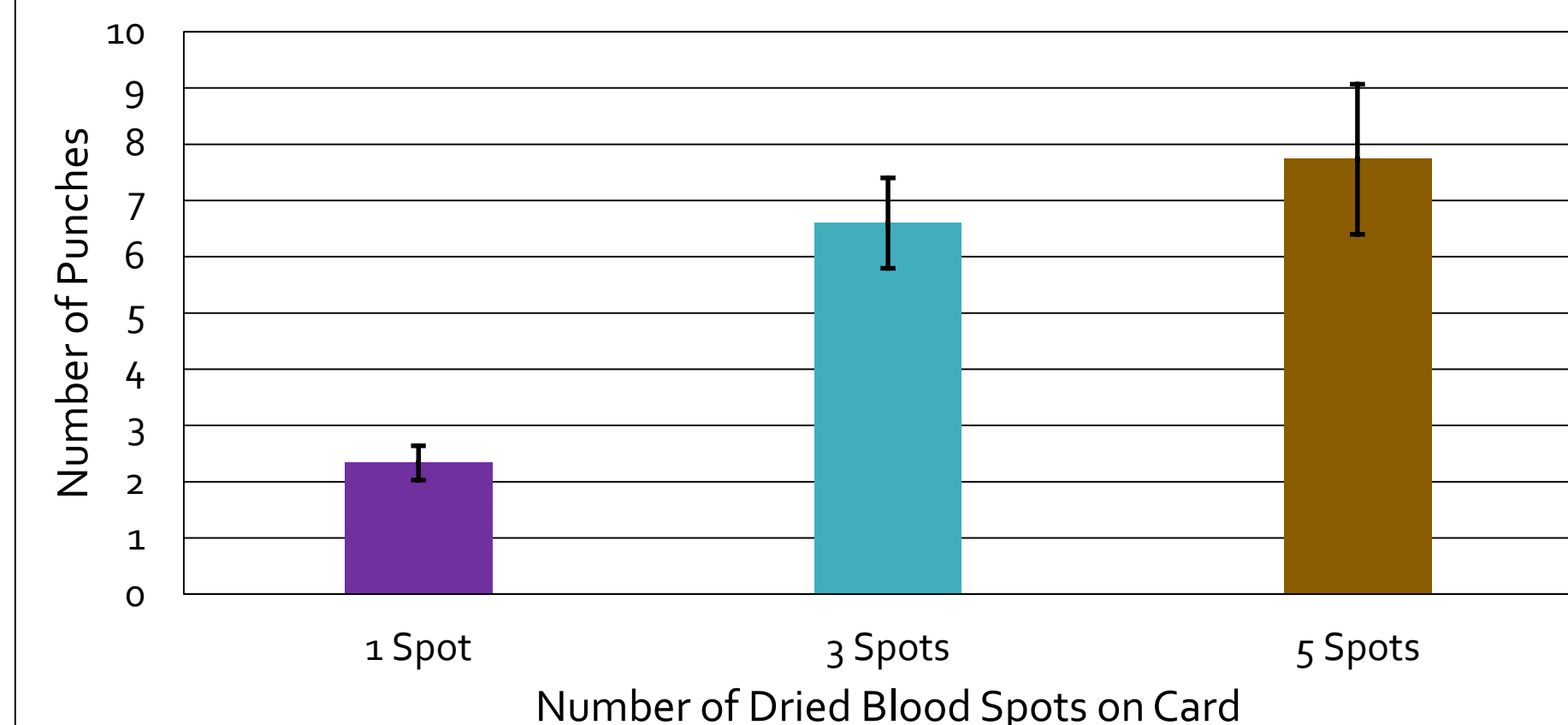
* Significant at p<0.05

A higher percentage of circles were completely filled for the 1-spot cards (73%), than 3-spot cards (60%) or 5-spot cards (37%). An average of 2 punches per spot were obtained from 1-spot and 3-spot cards; and average 1 punch per spot was obtained from 5-spot cards. The 3-spot card yielded an average of 6 full punches per card compared with 5 punches for the 5-spot card. There was no significant difference by card type in adequacy for testing ($X^2=1.6$, $p=0.82$).

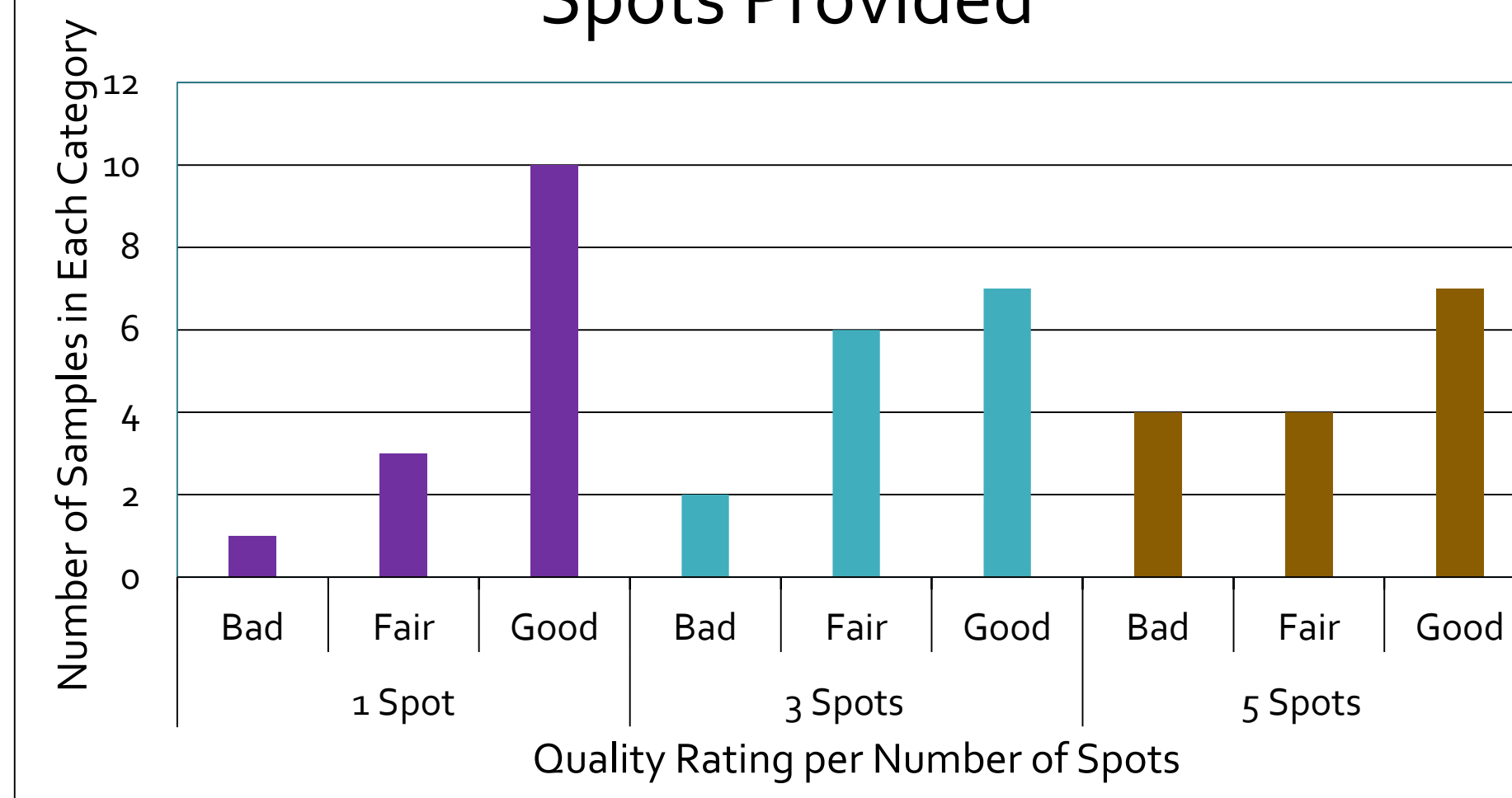
Conclusions

Adequate specimens for HIV testing were obtained using 1-, 3- and 5-spot cards. There is a benefit of 3- or 5-spot cards over a 1-spot card regarding the number of punches available for testing per card. There is no marginal benefit of a 5-spot card over a 3-spot card in regard to number of punches available for testing. Studies using self-collected DBS samples for HIV testing may want to consider using a 3-spot collection card in preference to a 1- or 5-spot collection card in efforts to decrease participant burden without affecting the adequacy of the sample for testing or sample quality.

Quantity of Sample by Number of Spots Provided



Quality of Sample by Number of Spots Provided



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