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Background: Blood typing, donor compatibility testing, and hematocrit analysis are common tests that are important in many clinical applications, including those found in high-stakes settings such as the trauma center. These tests are typically performed in centralized laboratories with sample batching; the minutes that are lost in this mode can lead to adverse outcomes, especially for critical-care patients. As a step toward providing rapid results at the bedside, we developed a point-of-care hemagglutination system relying on digital microfluidics (DMF) and a unique, automated readout tool, droplet agglutination assessment using digital microfluidics (DAAD). Methods: ABO and Rhesus blood grouping, donor crossmatching, and hematocrit assays were developed on a portable DMF platform that allowed for automated sample processing. The result of each assay could be determined by eye or automatically with the DAAD imaging tool. Results: DMF-DAAD was applied to 109 samples collected from different sources (including commercial samples, pinpricks from volunteers, and a hospital blood bank), with perfect fidelity to gold-standard results. Some of these tests were carried out by a nonexpert in a hospital trauma center. Proof-of-concept results were also collected from smaller sample sets for donor compatibility testing and hematocrit analysis. Conclusion: DMF-DAAD shows promise for delivering rapid, reliable results in a format well suited for a trauma center and other settings where every minute counts. Keywords: instrumentation; laboratory methods and tools; point-of-care testing systems. View PDFVolume 3, March 2015, Pages 59-64 rights and contentsSPRsurface plasmon resonancePBSphosphate-buffered saline Article contents Figures & tables Video Audio Supplementary Data Point-of-Care Testing You do not currently have access to this article. 1. Jain A., Garg S., Marwaha N., Sharma R.R. 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