

LIQUID CRYSTAL THERMOMETRY STUDY

Kaiser Permanente Nursing Research Committee - Walnut Creek CA
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PURPOSE: Liquid crystal skin temperature monitoring may offer safety, cost, time, and comfort benefits as compared to traditional thermometry methods. Available for use since the 1970s, they initially were not accurate and reliable, but now second-generation products are believed to be accurate during the operative and post-operative periods. With efforts to find faster, easier, more convenient ways of doing routine tasks within the hospital setting, these temperature strips are being used throughout hospital settings, for varying periods of time and with various placement locations. The purpose of this study was to investigate liquid crystal thermometry (LCT) throughout one hospital setting, to determine if it was accurate, reliable, and cost effective for routine clinical usage.

METHODS: The study was conducted at Kaiser Permanente Medical Center at Walnut Creek, California. A descriptive and correlational study design examined the relationship between different thermometry temperatures taken concurrently. A time driven sampling plan was used to enroll a convenience sample. Sample size was determined through power analysis. Institutional Review Board approval was obtained through the Kaiser Foundation Research Institute and verbal informed consent was obtained from all participants. Each time the staff took a participant's temperature for routine patient care, both a LCT temperature and one standard temperature were taken concurrently; demographic data were also recorded.

RESULTS: The study enrolled 701 participants: 472 adults and 34 children with mostly surgical diagnoses; and 195 newborn infants. For all three age groups, 2354 concurrent temperatures were recorded. The LCT strips read as expected, slightly higher than other non-invasive thermometry methods (.27 degree Fahrenheit), as they were calibrated for core temperatures rather than skin. Forty-five percent of the difference scores were within 1 degree of traditional methods, and 81% were within 2 degrees for the adults and children. This contrasted with the differences in newborns of almost 3 degrees and over 3 degrees in newborns with radiant warmers. The newborn data requires further study as sample sizes were not adequate. Preferred locations of the LCT were the chest and forehead (difference is less than half a degree) rather than the neck (closer to 1 degree different). The study did not produce evidence that LCT was not accurate on certain patients. Patients were satisfied with LCT thermometry and actually preferred it over traditional methods. Staff ranked availability and application ease high but ranked ease of reading and convenience lower. LCT appeared to be very cost effective based on the hours it was left in place, and a small time study demonstrated significant time savings compared to traditional methods.

RECOMMENDATIONS: Routine use for newborns requires further research. But given the results of this study and that prior laboratory research on this methodology suggest that LCT was more accurate than other skin thermometry methods, it would seem reasonable to recommend LCT use in general hospital settings for adults and children. Until further research can be conducted to examine which patients are not suited for LCT, it would seem prudent for use on low-risk patients or situations, and for monitoring trends over time. Temperatures that do not appear valid would still require confirmation with traditional methodologies. Clinical situations that require more precise measurement than to the nearest half degree would also require traditional methods.