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The effect of temperature, needle gauge and wall thickness on the force required for needles to puncture sharps containers

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Abstract

Healthcare workers sustain sharps injuries via needles penetrating sharps containers (SC). Little published data exists on the parameters affecting SC puncturing. This study examined the effect on puncture force of varying 5 needle gauges, three temperatures and three container wall thicknesses. Puncturing was significantly easier with higher temperatures, finer needles and thinner walls. Puncture forces as low as 5.2N indicate that with high temperatures and finer needles, 44% of containers would not meet the 15N required by ISO. Tougher puncture testing procedures need be considered as modern engineering and technology now enable safer SC to be produced.