Supplemental files for "Diagnostic accuracy of calculated serum osmolarity to predict dehydration in older people: adding value to pathology lab reports"

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Supplemental Table 1. Osmolarity equations tested against directly measured osmolality used in this report.

Equation	**Formula**	**Reference**
Serum or plasma osmolality, mOsm/kg	**Directly measured**	
Equation 1, mOsm/L	$1.75 \times Na^+ + glucose + 0.5 \times urea + 10.1$	(1)
Equation 2, mOsm/L	$2.63 \times Na^+ - 65.4$	(1)
Equation 3, mOsm/L	$1.86 \times Na^+ + glucose + 0.5 \times urea$	(2)
Equation 4, mOsm/L	$2 \times (Na^+ + K^+) + glucose + 0.5 \times urea$	(3;4)
Equation 5, mOsm/L	$2 \times Na^+$	(5)
Equation 6, mOsm/L	$2 \times Na^+ + glucose + 0.5 \times urea$	(6)
Equation 7, mOsm/L	$2 \times Na^+ + 7$	(7)
Equation 8, mOsm/L	$2 \times Na^+ + 10$	(8)
Equation 9, mOsm/L	$2 \times Na^+ + glucose$	(9;10)
Equation 10, mOsm/L	$2.1 \times Na^+$	(11)
Equation 11, mOsm/L	$2 \times Na^+ + glucose + 0.93 \times 0.5 \times urea$	(12)
Equation 12, mOsm/L	$(2 \times (Na^+ + K^+) + glucose + 0.5 \times urea) \times 0.985$	(4)
Equation 13, mOsm/L	$1.86 \times Na^+ + glucose + 0.5 \times urea + 5$	(13)
Equation 14, mOsm/L	$2 \times Na^+ + 0.9 \times glucose + 0.93 \times urea \times 0.5$	(14)
Equation 15, mOsm/L	$2 \times Na^+ + 0.5 \times urea$	(14)
Equation 16, mOsm/L	$(1.86 \times Na^+ + glucose + 0.5 \times urea)/0.93$	(15)
Equation 17, mOsm/L	$1.9 \times (Na^+ + K^+) + glucose + 0.5 \times urea$	(16)
Equation 18, mOsm/L	$1.85 \times Na^+ + glucose + 0.5 \times urea + 8.55$	(17)
Equation 19, mOsm/L	$1.86 \times Na^+ + glucose + 0.5 \times urea + 9$	(18)
Equation 20, mOsm/L	$1.86 \times Na^+ + glucose + urea + 9$	(18)
Equation 21, mOsm/L	$2 \times (Na^+ + K^+) + glucose + 0.93 \times 0.5 \times urea$	(19)

Equation 22, mOsm/L	$1.89 \times Na^+ + 1.38 \times K^+ + 1.08 \times$ glucose $+ 1.03 \times$ urea $+ 7.47$	(20)
Equation 23, mOsm/L	$1.86 \times (Na^+ + K^+)$ + glucose + urea + 10	(20)
Equation 24, mOsm/L	$2 \times Na^+ + 0.9 \times$ glucose $+ 0.93 \times 0.5 \times$ urea + 8	(21)
Equation 25, mOsm/L	$1.86 \times Na^+ + 1.03 \times$ glucose $+ 1.28 \times 0.5 \times$ urea	(22)
Equation 25a, mOsm/L	$(1.86 \times Na^+ + 1.03 \times$ glucose $+ 1.28 \times 0.5 \times$ urea$) \times 0.985$	(22)
Equation 26, mOsm/L	$1.36 \times Na^+ + 1.6 \times$ glucose $+ 0.45 \times$ urea + 91.75	(23)
Equation 27, mOsm/L	$2 \times Na^+$ + glucose + urea + 35.2	(24)
Equation 27a, mOsm/L	$(2 \times Na^+$ + glucose + urea + 35.2$) \times 0.985$	(24)
Equation 28, mOsm/L	$1.897 \times Na^+$ + glucose + urea $\times 0.5 + 13.5$	(25)
Equation 29, mOsm/L	$1.9 \times (Na^+ + K^+)$ + glucose + urea $\times 0.5 + 5$	(25)
Equation 30, mOsm/L	$1.86 \times (Na^+ + K^+)$ + glucose + urea	(26)
Equation 31, mOsm/L	$2 \times Na^+ + 1.15 \times$ glucose + urea	(27)
Equation 32, mOsm/L	$1.86 \times (Na^+ + K^+) + 1.15 \times$ glucose + urea + 14	(27)
Equation 33, mOsm/L	$1.09 \times 1.86 \times Na^+$ + glucose + urea	(28)
Equation 34, mOsm/L	$2 \times (Na^+ + K^+)$ + glucose + urea	(29;30)
Equation 35 (tonicity), mOsm/L	$2 \times (Na^+ + K^+)$ + glucose	(10;31)
Equation 36, mOsm/L	$1.86 \times Na^+$ + glucose + urea	(32)
Equation 37, mOsm/L	$2 x Na^+$ + urea + glucose	(10;33)

Supplemental Table 2. Correlation of directly measured serum osmolality (in mOsm/kg) with the biochemical parameters used in algorithms for the calculation of serum osmolarity

	NU-AGE (n=236)		**DRIE** (n=172)		**Fortes** (n=97)		**Sjöstrand** (n=36)		**Pfortmueller** (n=54)	
	r	**p-value**	**r**	**p-value**	**r**	**p-value**	**r**	**p-value**	**r**	**p-value**
Sodium, *mmol/L*	0.62	<0.001	0.74	<0.001	0.76	<0.001	0.65	<0.001	0.20	0.15
Potassium, *mmol/L*	0.16	0.02	0.15	0.05	0.20	0.05	-0.24	0.16	-0.02	0.89
Urea, *mmol/L*	0.16	0.02	0.47	<0.001	0.68	<0.001	0.54	<0.001	0.17	0.21
Creatinine, *µmol/L*	0.16	0.02	0.32	<0.001	0.51	<0.001	0.24	0.15	0.21	0.14
Glucose, *mmol/L*	0.11	0.10	0.36	<0.001	0.08	0.46	0.28	0.10	0.16	0.25

n= number of participants; r= Pearson's coefficient of correlation

Supplemental Table 3. Characterising by hydration status, across all five cohorts

	Euhydrated (n=296, 50%)	**Impending dehydration** (n=183, 31%))	**Current dehydration** (n=116, 19%)
Directly measured osmolality	265 to <295 mOsm/kg	295 to 300 mOsm/kg	>300 mOsm/kg
Number with raised serum sodium (>145mmol/L)	0 (0%)	3 (2%)	5 (4%)
Number with raised serum potassium (>5mmol/L)	15 (5%)	8 (4%)	4 (3%)
Number with raised serum urea (>7.1mmol/L)	66 (22%)	55 (30%)	58 (50%)
Number with raised serum glucose (>7.8mmol/L)	41 (14%)	20 (11%)	19 (16%)

Supplemental Table 4: Comparison of directly measured serum osmolality (mOsm/kg) and calculated osmolarity by each equation (mOsm/L)

For each of the five cohorts data show the mean directly measured serum osmolality (mOsm/kg), and mean calculated osmolarity (mOsm/L) for each equation, p-value of the paired t-test comparing calculated osmolarity vs directly measured osmolality, and difference between directly measured serum osmolality and calculated osmolarity (mOsm, directly measured serum osmolality minus calculated osmolarity).

Cohort		NU-AGE (n=236)					DRIE (n=172)					Fortes (n=97)					Sjöstrand (n=36)					Pfortmueller (n=54)				
Charac-teristic		mean	SD	p	Difference		mean	SD	p	Difference		mean	SD	p	Difference		mean	SD	p	Difference		mean	SD	p	Difference	
					Mean	SD				Mean	SD				Mean	SD				Mean	SD				Mean	SD
Directly measured osmolality		**296.0**	**7.0**				**292.2**	**9.3**				**286.7**	**14.4**				**299.7**	**7.0**				**290.9**	**8.6**			
Equations, mOsm	1	264.2	4.0	**	31.8	5.4	261.0	7.7	**	30.9	4.3	260.7	10.4	**	26.0	7.2	269.5	4.9	**	30.3	4.6	259.0	8.7	**	31.8	10.2
	2	304.5	5.8	**	-8.6	5.7	296.2	10.0	**	-4.0	7.0	293.9	13.6	**	-7.2	9.6	309.6	6.1	**	-9.9	5.5	291.3	11.5	0.80	-0.5	12.9
	3	269.5	4.2	**	26.5	5.4	266.0	8.0	**	25.9	4.3	265.6	11.0	**	21.1	7.2	275.0	5.2	**	24.7	4.6	263.9	9.1	**	27.0	10.5
	4	297.8	4.6	**	-1.8	5.4	293.6	8.5	**	-1.7	4.1	293.5	11.7	**	-6.8	6.8	302.9	5.3	*	-3.2	4.7	291.4	9.6	0.71	-0.5	10.8
	5	281.3	4.4	**	14.7	5.5	275.0	7.6	**	17.1	6.3	273.2	10.3	**	13.5	9.3	285.2	4.6	**	14.6	5.3	271.3	8.8	**	19.6	11.0
	6	289.2	4.6	**	6.8	5.4	285.2	8.5	**	6.7	4.4	284.7	11.6	*	2.0	7.1	295.0	5.5	**	4.7	4.6	282.8	9.7	**	8.0	10.9
	7	288.3	4.4	**	7.7	5.5	282.0	7.6	**	10.1	6.3	280.2	10.3	**	6.5	9.3	292.2	4.6	**	7.6	5.3	278.3	8.8	**	12.6	11.0
	8	291.3	4.4	*	4.7	5.5	285.0	7.6	**	7.1	6.3	283.2	10.3	*	3.5	9.3	295.2	4.6	*	4.6	5.3	281.3	8.8	**	9.6	11.0
	9	286.5	4.4	**	9.5	5.4	281.7	8.2	**	10.2	5.0	280.3	10.3	**	6.4	9.0	290.9	5.1	**	8.8	5.3	278.0	9.3	**	12.9	10.9
	10	295.4	4.6	0.10	0.6	5.5	288.8	8.0	**	3.3	6.4	286.9	10.8	0.86	-0.2	9.3	299.4	4.9	0.74	0.3	5.3	284.8	9.2	*	6.0	11.3
	11	289.0	4.5	**	6.9	5.4	285.0	8.5	**	6.9	4.4	284.4	11.5	*	2.3	7.2	294.7	5.4	**	5.0	4.6	282.5	9.6	**	8.3	10.8
	12	293.3	4.6	**	2.7	5.4	289.2	8.4	**	-2.6	4.1	289.1	11.6	*	-2.4	6.8	298.3	5.2	0.08	1.4	4.7	287.0	9.5	0.01	3.8	10.7
	13	274.5	4.2	**	21.5	5.4	271.0	8.0	**	20.9	4.3	270.6	11.0	**	16.1	7.2	280.0	5.2	**	19.7	4.6	268.9	9.1	**	22.0	10.5
	14	288.5	4.5	**	7.5	5.4	284.3	8.4	**	7.6	4.5	283.7	11.5	*	3.0	7.2	294.1	5.4	**	5.6	4.6	281.8	9.5	**	9.0	10.8
	15	284.0	4.5	**	12.0	5.5	278.5	7.8	**	13.6	5.6	277.6	11.6	**	9.1	7.5	289.3	5.0	**	10.5	4.6	274.6	8.8	**	16.2	10.8
	16	289.8	4.6	**	6.2	5.4	286.0	8.7	**	5.9	4.3	285.6	11.8	0.13	1.1	7.0	295.7	5.6	**	4.0	4.6	283.7	9.8	**	7.1	10.9

	17	283.3	4.4	**	12.7	5.4	279.5	8.2	**	12.4	4.0	279.4	11.2	**	7.3	6.8	288.2	5.1	**	11.5	4.7	277.4	9.3	**	13.4	10.6
	18	276.7	4.2	**	19.3	5.4	273.1	8.0	**	18.7	4.3	272.8	10.9	**	13.9	7.2	282.2	5.2	**	17.5	4.6	271.0	9.1	**	19.8	10.5
	19	278.5	4.2	**	17.5	5.4	275.0	8.0	**	16.9	4.3	274.6	11.0	**	12.1	7.2	284.0	5.2	**	15.7	4.6	272.9	9.1	**	18.0	10.5
	20	281.3	4.4	**	14.7	5.5	278.5	8.6	**	13.4	4.0	279.0	12.9	**	7.7	6.2	288.1	5.9	**	11.6	4.3	277.7	10.5	**	13.1	11.3
	21	297.6	4.6	**	-1.6	5.4	293.4	8.5	**	-1.4	4.1	293.2	11.6	**	-6.5	6.9	302.6	5.3	*	-2.9	4.7	291.1	9.5	0.89	-0.2	10.8
	22	290.4	4.6	**	5.6	5.4	287.6	8.8	**	4.2	3.8	288.5	13.3	*	-1.8	6.1	297.0	5.9	*	2.7	4.3	287.0	10.8	0.02	3.9	11.5
	23	290.2	4.5	**	5.8	5.4	287.3	8.6	**	4.5	3.7	288.2	13.1	0.02	-1.5	6.1	296.5	5.7	*	3.3	4.3	286.7	10.6	*	4.2	11.4
	24	296.5	4.5	0.13	-0.5	5.4	292.3	8.4	0.29	-0.4	4.5	291.7	11.5	**	-5.0	7.2	302.1	5.4	*	-2.4	4.6	289.8	9.5	0.49	1.0	10.8
	25	270.5	4.3	**	25.5	5.4	267.2	8.2	**	24.7	4.2	267.1	11.5	**	19.6	6.8	276.4	5.4	**	23.4	4.4	265.4	9.5	**	25.4	10.6
	25a	266.4	4.2	**	29.6	5.4	263.1	8.1	**	28.7	4.2	263.1	11.3	**	23.6	6.8	272.2	5.3	**	27.5	4.4	261.4	9.3	**	29.4	10.5
	26	293.8	3.2	**	2.2	5.6	292.8	7.5	0.02	-0.9	5.0	292.9	8.9	**	-6.2	8.3	298.5	4.5	0.15	1.2	4.8	291.3	8.5	0.72	-0.5	10.0
	27	327.1	4.7	**	-31.2	5.5	323.9	9.1	**	-32.0	4.1	324.4	13.5	**	-37.6	6.3	334.3	6.2	**	-34.7	4.8	322.9	10.9	**	-32.1	11.6
	27a	322.2	4.7	**	-26.2	5.5	319.0	8.9	**	-27.1	4.0	319.5	13.3	**	-32.8	6.3	329.3	6.1	**	-34.6	4.3	318.1	10.8	**	-27.2	11.5
	28	288.2	4.3	**	7.7	5.4	284.5	8.2	**	7.3	4.3	284.2	11.1	*	2.5	7.1	293.8	5.3	**	5.9	4.6	282.4	9.3	**	8.5	10.6
	29	288.3	4.4	**	7.7	5.4	284.5	8.2	**	7.4	4.0	284.4	11.2	*	2.3	6.8	293.2	5.1	**	6.5	4.7	282.4	9.3	**	8.4	10.6
	30	280.2	4.5	**	15.8	5.4	277.3	8.6	**	14.5	3.7	278.2	13.1	**	8.5	6.1	286.5	5.7	**	13.3	4.3	276.7	10.6	**	14.2	11.4
	31	292.7	4.7	**	3.3	5.5	289.7	9.2	**	2.1	4.0	290.2	13.6	**	-3.5	6.3	300.0	6.3	0.74	-0.2	4.4	288.7	11.1	0.18	2.1	11.7
	32	295.0	4.5	*	1.0	5.4	292.3	8.8	0.12	-0.4	3.7	293.2	13.1	**	-6.5	6.1	301.3	5.8	0.03	-1.6	4.4	291.7	10.8	0.60	-0.8	11.5
	33	295.8	4.8	0.59	0.2	5.5	292.5	9.1	0.07	-0.5	4.1	292.9	13.7	**	-6.2	6.3	303.0	6.2	*	-3.3	4.3	291.4	11.0	0.72	-0.6	11.7
	34	300.5	4.8	**	-4.5	5.4	297.1	9.0	**	5.2	3.7	297.9	13.7	**	-11.2	6.1	307.0	6.0	**	-7.3	4.4	296.3	11.1	*	-5.4	11.7
	35	295.1	4.5	*	0.9	5.4	290.1	8.2	**	1.7	4.8	289.1	10.3	*	-2.4	8.5	298.8	4.9	0.30	0.9	5.4	286.5	9.0	*	4.3	10.8
	36	272.3	23.7	**	23.7	5.5	269.5	8.6	**	7.4	4.3	270.0	12.9	**	16.7	6.2	279.1	5.9	**	20.6	4.3	268.7	10.5	**	22.1	11.3

	37	291.9	4.7	**	4.0	5.5	288.7	9.1	**	3.2	4.1	289.2	13.5	*	-2.4	6.3	299.1	6.2	0.40	0.6	4.3	287.7	10.9	0.05	3.1	11.6

SD= standard deviation

p-value refers to the p-value of the paired t-test, comparing the results of the equation vs directly measured osmolality, **<0.0001, *<0.01

Supplemental Table 5: Correlation analysis of the association of difference (Δ, measured serum osmolality minus osmolarity) with osmolality, biochemical parameters, age, and measures of nutritional, cognitive and functional status. Pearson's coefficients of correlation (r) are shown for each of the five potential equations in each cohort.

	NU-AGE					**DRIE**					**Fortes**					**Sjöstrand**					**Pfortmueller**				
Equation	**10**	**24**	**26**	**32**	**33**	**10**	**24**	**26**	**32**	**33**	**10**	**24**	**26**	**32**	**33**	**10**	**24**	**25**	**32**	**33**	**10**	**24**	**26**	**32**	**33**
Osmo-lality, *mOsm/kg*	0.75**	0.76**	0.89**	0.76**	0.73**	0.54**	0.47**	0.63**	0.39**	0.31**	0.66**	0.61**	0.82**	0.41**	0.33*	0.72**	0.64**	0.77**	0.56**	0.47*	0.60**	0.54**	0.59**	0.46**	0.44**
Sod-ium, *mmol/L*	-0.06	-0.03	0.23**	0.01	-0.06	-0.17*	-0.14	-0.40**	-0.02	-0.21*	0.02	0.01	0.44**	0.00	-0.16	-0.07	-0.11	0.16	-0.05	-0.18	-0.66**	-0.63**	-0.37*	-0.49**	-0.59**
Potas-sium, *mmol/L*	0.16*	0.14*	0.15*	0.03	0.12	0.38**	0.46**	0.33**	0.28**	0.46**	0.40**	0.37**	0.30*	0.04	0.23*	-0.05	-0.02	-0.10	-0.18	0.02	0.21	0.10	0.02	-0.16	0.00
Urea, *mmol/L*	0.08	-0.01	0.03	-0.13*	-0.13	0.57**	0.42**	0.34**	0.06	0.09	0.69**	0.50**	0.57**	0.02	0.05	0.60**	0.37*	0.37*	0.06	0.04	0.12	-0.10	-0.05	-0.41*	-0.37*
Creat-inine, *µmol/L*	0.11	0.05	0.06	-0.03	-0.01	0.40**	0.31**	0.26**	0.07	0.09	0.60**	0.45**	0.47**	0.03	0.08	0.27	0.11	0.09	-0.03	-0.05	0.26	0.14	0.16	-0.09	-0.07
Glucose, *mmol/L*	0.16*	0.06	-0.03	0.03	0.05	0.62**	0.19*	-0.31**	-0.09	0.06	0.28*	0.01	-0.26*	-0.13	-0.06	0.16	-0.10	-0.12	-0.21	-0.21	0.19	-0.10	-0.40*	-0.15	-0.08
eGFR mL/ min/1.73 m^2	-0.07	-0.02	-0.05	0.05	0.05	-0.38**	-0.28**	-0.23*	-0.06	-0.08	-0.54**	-0.40**	-0.41**	-0.02	-0.06	-0.39*	-0.24	-0.21	-0.08	-0.06	-0.31*	-0.16	-0.18	0.08	0.04
Age, *years*	0.05	0.05	0.06	0.04	0.04	0.01	0.03	-0.11	-0.09	-0.06	0.16	0.13	0.05	0.02	0.07	0.15	0.16	0.15	0.12	0.15	-0.11	-0.09	-0.05	-0.03	-0.07
BMI, *kg/m^2*	0.17*	0.14*	0.15*	0.12	0.13	0.11	0.06	0.01	0.04	0.05	ND	ND	ND	ND	ND	0.20	0.18	0.16	0.16	0.14	ND	ND	ND	ND	ND
Hb, g/dL	-0.01	-0.03	-0.02	-0.04	-0.04	-0.16*	-0.05	0.08	0.12	0.05	-0.06	0.05	0.06	0.25*	0.20*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cognit-ive status	MMSE 0.06	MMSE 0.06	MMSE 0.04	MMSE 0.06	MMSE 0.06	MMSE -0.12	MMSE -0.16*	MMSE -0.22*	MMSE -0.21*	MMSE -0.16*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Funct-ional status	IADL -0.09	IADL -0.07	IADL -0.05	IADL -0.02	IADL -0.05	BI -0.01	BI 0.03	BI 0.08	BI 0.09	BI 0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

BMI: body mass index; eGFR: estimated glomerular filtration rate; Hb: haemoglobin; MMSE=Mini Mental State Examination; BI Barthel Index; ND no data.
*$p<0.05$; ** $p<0.001$.

Supplemental Table 6. ROC plots, areas under the curve, with standard errors and 95% confidence intervals. Diagnostic accuracy of each formula compared to serum or plasma osmolality (current dehydration defined as >300mOsm/kg).

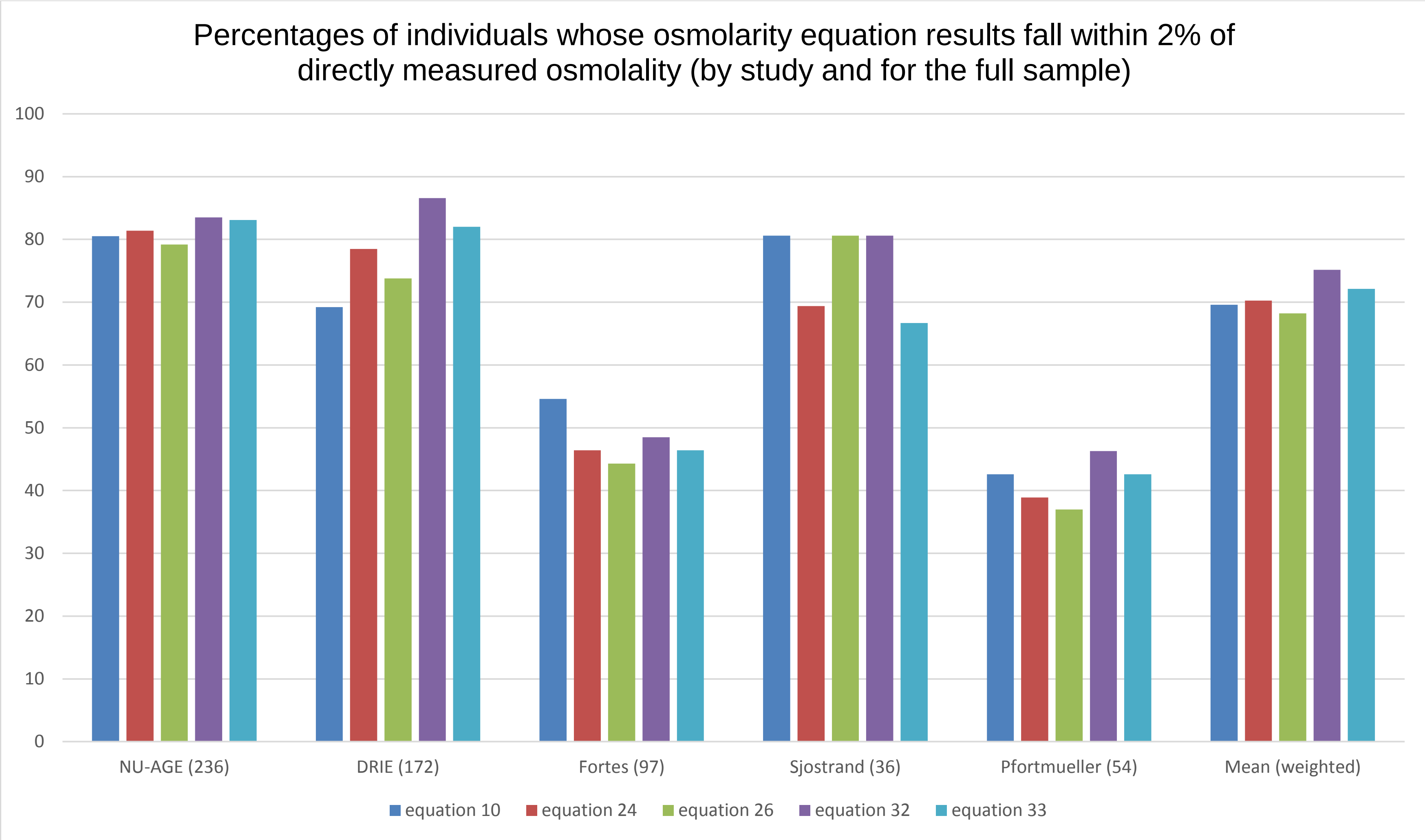
equation	**NU-AGE (n=236)**		**DRIE (n=172)**		**Fortes (n=97)**		**Sjöstrand (n=36)**		**Pfortmueller (n=54)**	
	AUC (SE*)	**95%CI**	**AUC (SE)**	**95%CI**	**AUC (SE)**	**95%CI**	**AUC (SE)**	**95%CI**	**AUC (SE)**	**95%CI**
10	0.685 (0.040)	0.606, 0.764	0.731 (0.048)	0.637, 0.826	0.773 (0.078)	0.620, 0.925	0.788 (0.075)	0.641, 0.935	0.569 (0.131)	0.313, 0.825
24	0.686 (0.041)	0.606, 0.766	0.901 (0.027)	0.848, 0.954	0.965 (0.019)	0.927, 1.000	0.873 (0.060)	0.757, 0.990	0.684 (0.100)	0.489, 0.880
26	0.681 (0.040)	0.602, 0.760	0.904 (0.025)	0.856, 0.952	0.968 (0.017)	0.934, 1.000	0.877 (0.058)	0.763, 0.990	0.681 (0.113)	0.460, 0.901
32	0.679 (0.042)	0.597, 0.761	0.936 (0.019)	0.898, 0.973	0.968 (0.017)	0.934, 1.000	0.903 (0.052)	0.802, 1.000	0.731 (0.100)	0.535, 0.927
33	0.681 (0.042)	0.599, 0.762	0.925 (0.021)	0.884, 0.966	0.992 (0.009)	0.975, 1.000	0.897 (0.056)	0.788, 1.000	0.743 (0.096)	0.555, 0.931

AUC: area under the curve in the ROC plot.
SE: standard error
95%CI: 95% confidence interval

Supplemental Table 7. Sensitivity and specificity cut-offs for the combined datasets for current dehydration (measured serum or plasma osmolality >300mOsm/kg).

	Best specificity at sensitivity of ≥75%	Cut-point	Correctly classified	LR+	LR-
Eq10	58%	≥294.0	62%	1.82	0.41
Eq24	69%	≥297.3	70%	2.40	0.36
Eq26	68%	≥295.0	69%	2.32	0.37
Eq32	71%	≥296.7	72%	2.57	0.35
Eq33	73%	≥297.6	73%	2.74	0.34
	Best specificity at sensitivity of ≥80%				
Eq32	67%	≥296.1	69%	2.42	0.30
Eq33	67%	≥296.8	70%	2.45	0.30
	Best specificity at sensitivity of ≥85%				
Eq32	56%	≥294.7	62%	1.95	0.26
Eq33	60%	≥295.8	65%	2.15	0.24
	Best specificity at sensitivity of ≥90%				
Eq32	48%	≥293.6	56%	1.75	0.20
Eq33	50%	≥294.1	58%	1.80	0.19

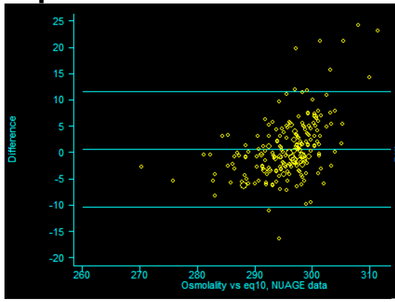
Supplemental Figure 1. Percentages of individuals whose osmolarity equation results fall within 2% of measured osmolality, by cohort and for the full (weighted) sample.



Supplemental Figure 2. Bland Altman plots, comparing measured serum osmolality (mOsm/kg) with five equations for osmolarity (all in mOsm/L). Each plot compares (measured osmolality + osmolarity using that equation)/2 on the x-axis with measured osmolality – osmolarity using that equation on the y-axis.

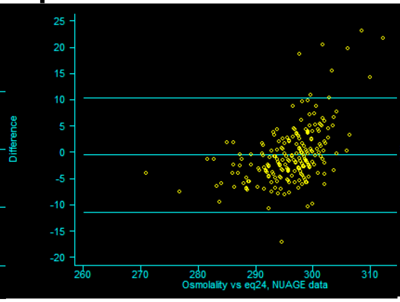
NU-AGE

Equation 10



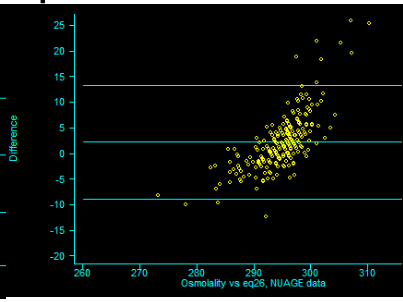
Correlation 0.6157
LA: -10.448 to 11.647 (22.1)
MD: 0.600 (CI -0.109 to 1.308)

Equation 24



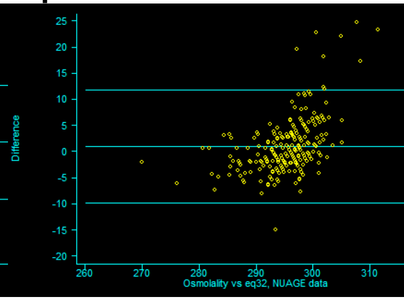
Correlation 0.6308
LA: -11.395 to 10.332 (21.7)
MD: -0.531 (CI -1.228 to 0.165)

Equation 26



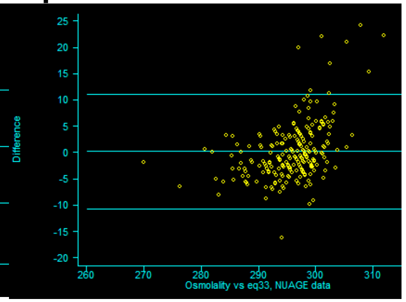
Correlation 0.6272
LA: -8.949 to 13.326 (22.3)
MD: 2.189 (CI 1.474 to 2.903)

Equation 32



Correlation 0.6328
LA: -9.815 to 11.864 (21.7)
MD: 1.024 (CI 0.329 to 1.719)

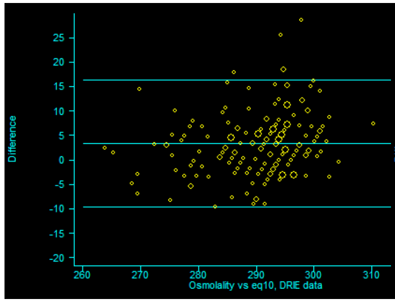
Equation 33



Correlation 0.6258
LA: -10.756 to 11.140 (21.9)
MD: 0.192 (CI -0.510 to 0.894)

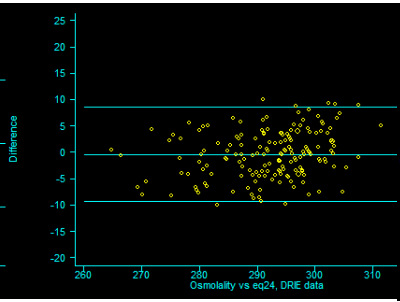
DRIE

Equation 10



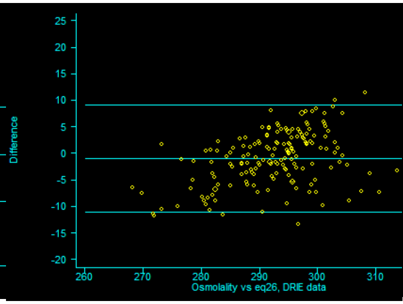
Correlation 0.7424
LA: -9.568 to 16.334 (25.9)
MD: 3.383 (CI 2.408 to 4.358)

Equation 24



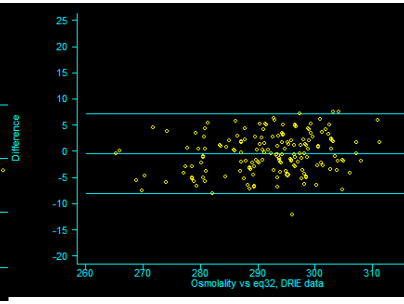
Correlation 0.8811
LA: -9.378 to 8.648 (18.0)
MD: -0.365 (CI -1.043 to 0.313)

Equation 26



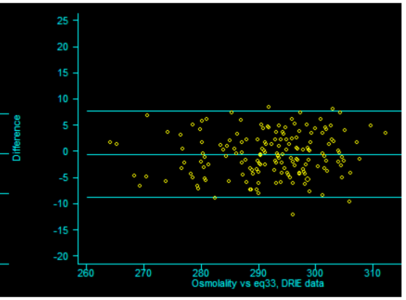
Correlation 0.8509
LA: -11.020 to 9.170 (20.2)
MD: -0.925 (CI -1.685 to -0.165)

Equation 32



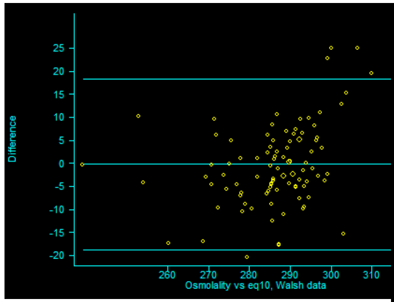
Correlation 0.9184
LA: -7.988 to 7.091 (15.1)
MD: -0.449 (CI -1.016 to 0.119)

Equation 33

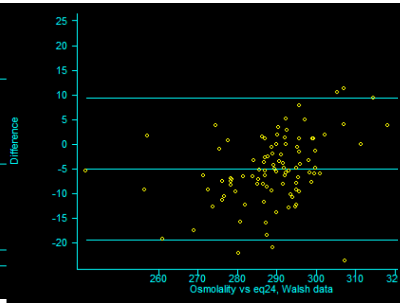


Correlation 0.9040
LA: -8.782 to 7.651 (16.4)
MD: -0.565 (CI -1.183 to 0.053)

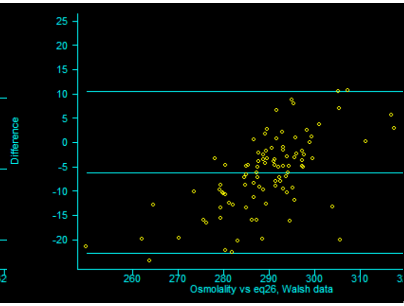
Fortes



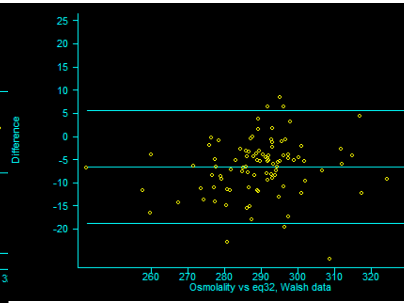
Correlation 0.7644
LA: -18.731 to 18.388 (37.1)
MD: -0.171 (CI -2.041 to 1.699)



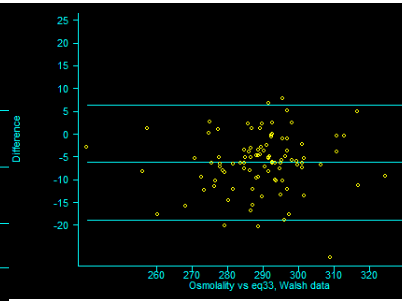
Correlation 0.8679
LA: -19.452 to 9.411 (28.9)
MD: -5.021 (CI -6.475 to -3.566)



Correlation 0.8479
LA: -22.835 to 10.445 (33.3)
MD: -6.195 (CI -7.872 to -4.518)

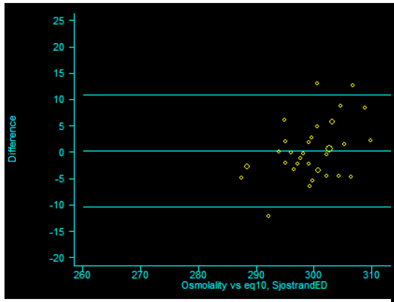


Correlation 0.9056
LA: -18.745 to 5.679 (24.4)
MD: -6.533 (CI -7.764 to -5.302)

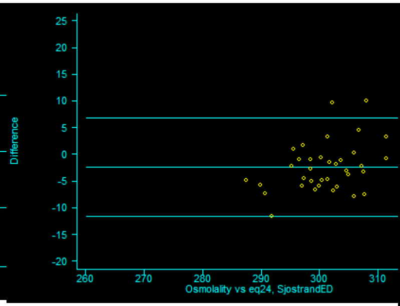


Correlation 0.9007
LA: -18.773 to 6.393 (25.2)
MD: -6.190 (CI -7.458 to -4.922)

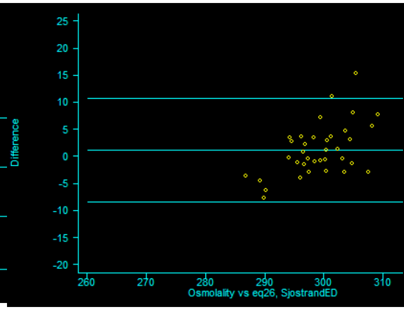
Sjös-trand



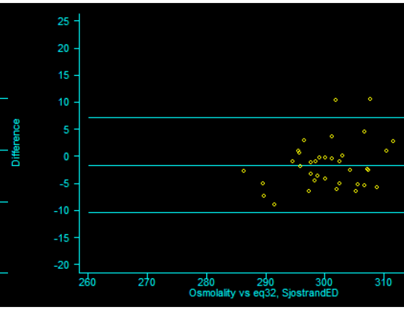
Correlation 0.6480
LA: -10.365 to 10.959 (21.3)
MD: 0.297 (CI -1.507 to 2.101)



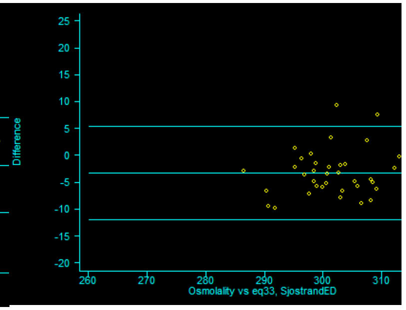
Correlation 0.7513
LA: -11.650 to 6.795 (18.4)
MD: -2.428 (CI -3.988 to -0.868)



Correlation 0.7302
LA: -8.432 to 10.799 (19.2)
MD: 1.183 (CI -0.443 to 2.810)

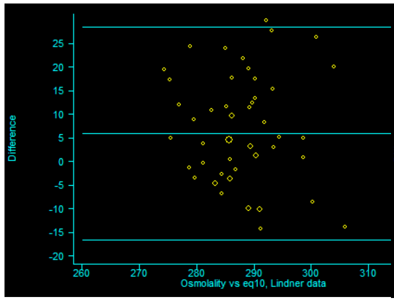


Correlation 0.7801
LA: -10.375 to 7.169 (17.5)
MD: -1.603 (CI -3.087 to -0.119)

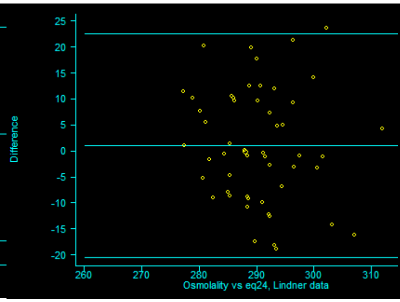


Correlation 0.7910
LA: -11.942 to 5.380 (17.3)
MD: -3.281 (CI -4.746 to -1.815)

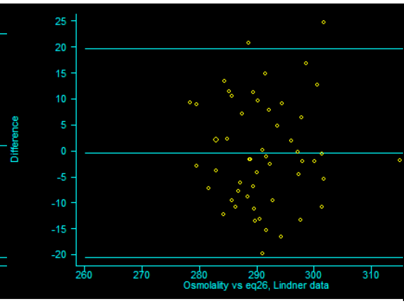
Pfort-mueller



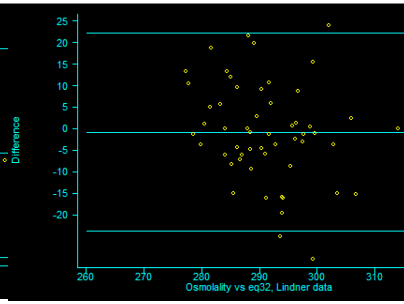
Correlation 0.1989
LA: -16.540 to 28.599 (45.1)



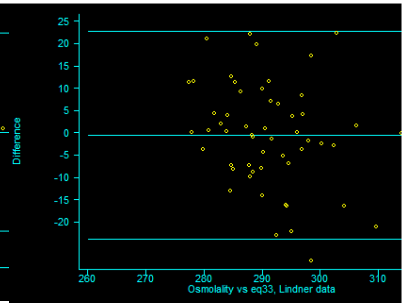
Correlation 0.2947
LA: -20.558 to 22.595 (43.2)



Correlation 0.3124
LA: -20.591 to 19.617 (40.2)



Correlation 0.3136
LA: -23.806 to 22.151 (46.0)



Correlation 0.3137
LA: -23.932 to 22.795 (46.7)

MD: 6.030 (CI 2.949 to 9.110)	MD: 1.019 (CI -1.926 to 3.963)	MD: -0.487 (CI -3.231 to 2.257)	MD: -0.828 (CI -3.964 to 2.308)	MD: -0.569 (CI -3.757 to 2.620)

Eq: osmolarity equation
LA: limits of agreement (followed by the size of the gap in brackets)
MD: mean difference

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