

*Injection Techniques Questionnaire (ITQ)
WorldWide Results*

2014-2015

Needle Reuse



DESCRIPTIVE STATISTICS

Do patients reuse their pen needle, and if so, how often?

Reuse Needle	N	%
Yes	6676	55.8
No	5285	44.2

Times	%
2 times	30.7
3 to 5 times	39.7
6 to 10 times	16.0
More than 10 times	13.6

How does this compare to syringes?

Reuse Needle	% Pens	% Syringes
Yes	55.8	38.8
No	44.2	61.2

Times	% Pens	% Syringes
2 times	30.7	35.4
3 to 5 times	39.7	44.0
6 to 10 times	16.0	11.4
More than 10 times	13.6	9.2

Why do they reuse the pen needles?

Reasons	%
Because I did not have another pen needle available	9.2
To save money	23.3
To prevent excess waste (environmental concern)	6.8
For convenience	41.2

How does this compare to syringes?

Reasons	% Pens	% Syringes
Because I did not have another pen needle available	9.2	14.5
To save money	23.3	38.4
To prevent excess waste (environmental concern)	6.8	6.6
For convenience	41.2	26.1

**COMPARATIVE
STATISTICS: DEMOGRAPHY**

Both Patient and Nurse were asked about Reuse

- PATIENT (one question was about pens, another about syringes)
 - *'If you use a pen, do you use your pen needle more than one time? Yes/No'*
 - *'If you use a syringe, do you use your pen needle more than one time? Yes/No'*
- NURSE (one question for all device types)
 - 'Does the patient use his/her needle more than one time? Yes/No'

Responses

Reuse Needle	% Pens
Yes	55.8
No	44.2

Patient

% Syringes
38.8
61.2

Reuse Needle	
Yes	49.5
No	50.5

Nurse

Is there an association between Patient-Reported Reuse of pen needles and Nurse-Reported Reuse?

Patient-Reported Reuse		Nurse-Reported Reuse	
		Yes	No
Yes	3107	341	
	44.2%	4.9%	
No	286	3289	
	4.1%	46.8%	

Is there an association between Patient-Reported Reuse of syringe needles and Nurse-Reported Reuse?

Patient-Reported Reuse		Nurse-Reported Reuse	
		Yes	No
Yes	Yes	911	90
		35.5%	3.5%
No	No	481	1087
		18.7%	42.3%

Reuse Percentages by Country (1)

	REUSE	
Country	Yes	No
USA	18.4	81.6
Canada	38.7	61.3
Russia	90.3	9.7
South Africa	96.7	3.3
Netherlands	18.5	81.5
Belgium	86.7	13.3
France	20.1	79.9
Spain	37.7	62.3
Italy	15.5	84.5
Switzerland	52.7	47.3
Austria	71.9	28.1

Reuse Percentages by Country (2)

	REUSE	
Country	Yes	No
UK	26.1	73.9
Denmark	30.3	69.7
Sweden	48.1	51.9
Poland	71.6	28.4
Germany	51.2	48.8
Perú	68.0	32.0
Mexico	48.9	51.1
Argentina	88.7	11.3
Brazil	61.8	38.2
Chile	95.2	4.8
Colombia	76.2	23.8

Reuse Percentages by Country (3)

	REUSE	
Country	Yes	No
Venezuela	72.0	28.0
Malaysia	93.6	6.4
Australia	40.0	60.0
Indonesia	78.6	21.4
Philippines	72.0	28.0
Singapore	12.5	87.5
S. Korea	40.2	59.8
China	77.8	22.2
Turkey	24.1	75.9
India	93.8	6.2
Ireland	45.5	54.5

Reuse Percentages by Country (4)

	REUSE	
Country	Yes	No
Finland	50.5	49.5
Czech Republic	82.2	17.8
Nicaragua	13.3	86.7
Taiwan	9.1	90.9
Saudi Arabia	33.9	66.1
United Arab Emirates	31.5	68.5
TOTAL	49.5	50.5

Both Patient and Nurse were asked about Reuse

- **PATIENT** (one question was about pens, another about syringes)
 - How many times do you use a single pen needle?
 - 2 times
 - 3 to 5 times
 - 6 to 10 times
 - More than 10 times
- **NURSE** (one question for all device types)
 - How many times does he/she (your patient) use a single needle?
 - 2 times
 - 3 to 5 times
 - 6 to 10 times
 - More than 10 times

Results

Country	2 times	3-5 times	6-10 times	>10 times
Nurse-Reported	31.2	41.0	15.4	12.4
Patient-Reported	30.7	39.7	16.0	13.6

Correspondence of Patient and Nurse data on Frequency of Reuse (yellow indicates disagreement)

		Patient-Reported Frequency			
		2 times	3-5 times	6-10 times	>10 times
Nurse Reported Frequency	2 times	861	79	20	10
	%	88.8%	8.1%	2.1%	1.0%
	3-5 times	92	1167	80	30
	%	6.7%	85.2%	5.8%	2.2%
	6-10 times	6	60	413	44
	%	1.1%	11.5%	79.0%	8.4%
	>10 times	3	21	42	390
	%	.7%	4.6%	9.2%	85.5%

Agreements = all 3-4 figure numbers; Disagreements = all 2 figure numbers

Reuse Frequency % by Country (1)

Country	2 times	3-5 times	6-10 times	>10 times
USA	39.3	50.0	8.9	1.8
Canada	42.4	43.2	7.2	7.2
Russia	15.5	42.7	26.2	15.5
South Africa	12.4	58.8	20.9	7.8
Netherlands	80.0	.0	.0	20.0
Belgium	12.1	59.6	19.1	9.2
France	38.8	30.6	8.2	22.4
Spain	33.8	43.2	9.5	13.5
Italy	63.0	30.4	2.2	4.3
Switzerland	44.8	41.4	3.4	10.3
Austria	42.9	49.4	6.5	1.3

Reuse Frequency % by Country (2)

Country	2 times	3-5 times	6-10 times	>10 times
UK	38.7	41.1	11.3	8.9
Denmark	.0	33.3	16.7	50.0
Sweden	10.0	44.0	16.0	30.0
Poland	6.2	27.2	33.3	33.3
Germany	31.7	54.1	11.4	2.8
Perú	64.7	35.3	.0	.0
Mexico	79.2	19.4	.0	1.4
Argentina	17.6	32.4	14.7	35.3
Brazil	26.8	47.1	19.0	7.2
Chile	70.0	30.0	.0	.0
Colombia	22.9	48.6	17.1	11.4

Reuse Frequency % by Country (3)

Country	2 times	3-5 times	6-10 times	>10 times
Venezuela	50.0	44.4	5.6	.0
Malaysia	50.0	34.8	10.9	4.3
Australia	30.8	41.0	10.3	17.9
Indonesia	45.9	31.1	14.8	8.1
Philippines	50.9	47.2	1.9	.0
Singapore	25.0	50.0	.0	25.0
S. Korea	38.4	37.0	11.0	13.7
China	22.8	33.3	18.5	25.5
Turkey	55.9	33.3	5.9	4.9
India	17.6	46.1	22.1	14.2
Ireland	25.0	30.0	20.0	25.0

Reuse Frequency % by Country (4)

Country	2 times	3-5 times	6-10 times	>10 times
Finland	29.4	51.0	11.8	7.8
Czech Republic	1.8	27.0	36.9	34.2
Nicaragua	100.0	.0	.0	.0
Taiwan	88.9	11.1	.0	.0
Saudi Arabia	75.4	22.2	1.8	.6
United Arab Emirates	47.1	44.1	8.8	.0
TOTAL	31.2	41.0	15.4	12.4

Is Reuse associated to Gender?

Gender	Reuse	
	Yes	No
Female	2038	2247
	47.6%	52.4%
Male	1990	1853
	51.8%	48.2%

p < 0.000

Is reuse associated with type of DM?

		Reuse	
		Yes	No
DM type	T1DM	1213	1508
		44.6%	55.4%
	T2DM	2795	2493
		52.9%	47.1%
	GDM	20	66
		23.3%	76.7%

p < 0.000

Is Reuse associated with age category of respondent?

		Reuse	
		Yes	No
Respondent	Adult	3583	3392
	%	51.4%	48.6%
	Adolescent	149	302
	%	33.0%	67.0%
	Child	71	149
	%	32.3%	67.7%
	3 rd Party	52	151
	%	25.6%	74.4%

p < 0.000

Is Reuse associated with device?

		Reuse	
		Yes	No
Device	Syringe	662	386
	%	63.2%	36.8%
	Pen	3153	3302
	%	48.8%	51.2%
	Other (pump)	19	103
	%	15.6%	84.4%
	Pen+Syringe	150	66
	%	69.4%	30.6%

p < 0.000

Is Reuse associated with number of injections/day?

		Reuse	
		Yes	No
Injections/ day	1	477	726
	%	39.7%	60.3%
	2	1345	839
	%	61.6%	38.4%
	3	477	421
	%	53.1%	46.9%
	4	1050	1584
	%	39.9%	60.1%
	5	319	339
	%	48.5%	51.5%
	6	107	69
	%	60.8%	39.2%
	7	33	30
	%	52.4%	47.6%
	>7	38	25
	%	60.3%	39.7%

p < 0.000

**COMPARATIVE
STATISTICS: ASSOCIATIONS**

Is there an association between LH and Reuse of pen needles as reported by patients?

LH	Reuses the Pen Needle	
	Yes	No
Yes	1144	927
█	55.2%	44.8%
No	2057	2409
█	46.1%	53.9%

p < 0.000

Is there an association between LH and Reuse of pen needles as reported by nurses?

LH	Reuses the Pen Needle	
	Yes	No
Yes	1306	1013
	56.3%	43.7%
No	2395	2824
	45.9%	54.1%

p < 0.000

Is LH associated with the number of times a needle is used?

Times Needle Used	LH	
	Yes	No
2 times	346 33.9%	675 66.1%
3 – 5 times	463 35.1%	855 64.9%
6 – 10 times	177 34.6%	334 65.4%
> 10 times	195 43.8%	250 56.2%
TOTAL	1181 35.8%	2114 64.2%

p = 0.002

Is the size of LH associated with the number of times a needle is used?

Times Needle Used	Abdominal LH		
	Mean Diameter (mm)	N	SD
2 times	39.1	183	29.1
3 – 5 times	45.1	317	29.4
6 – 10 times	39.0	142	30.4
> 10 times	54.0	131	40.6
TOTAL	44.1	773	32.1

p = 0.002

Is the size of LH associated with the number of times a needle is used?

Times Needle Used	Thigh LH		
	Mean Diameter (mm)	N	SD
2 times	34.6	65	25.5
3 – 5 times	42.5	112	34.9
6 – 10 times	45.3	43	41.7
> 10 times	54.8	32	53.4
TOTAL	42.5	252	37.2

p = 0.002

Is the size of LH associated with the number of times a needle is used?

Times Needle Used	Thigh LH		
	Mean Diameter (mm)	N	SD
2 times	34.6	65	25.5
3 – 5 times	42.5	112	34.9
6 – 10 times	45.3	43	41.7
> 10 times	54.8	32	53.4
TOTAL	42.5	252	37.2

p = 0.002

Is the size of LH associated with the number of times a needle is used?

Times Needle Used	Thigh LH		
	Mean Diameter (mm)	N	SD
2 times	34.6	65	25.5
3 – 5 times	42.5	112	34.9
6 – 10 times	45.3	43	41.7
> 10 times	54.8	32	53.4
TOTAL	42.5	252	37.2

p = 0.002

Is the size of LH associated with the number of times a needle is used?

Times Needle Used	Thigh LH		
	Mean Diameter (mm)	N	SD
2 times	34.6	65	25.5
3 – 5 times	42.5	112	34.9
6 – 10 times	45.3	43	41.7
> 10 times	54.8	32	53.4
TOTAL	42.5	252	37.2

p = 0.002

What is the weight of association with LH for each of these factors?

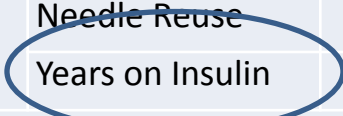
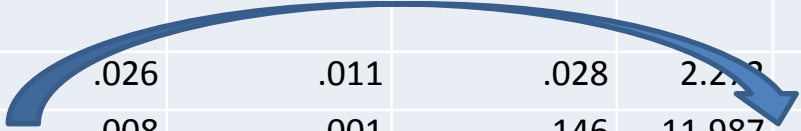
Linear Regression Model		Coefficients ^a				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.157	.026		81.477	.000
	Incorrect Rotation	-.349	.013	-.341	-27.881	.000
	Needle Reuse	.026	.011	.028	2.272	.023
	Years on Insulin	-.008	.001	-.146	-11.987	.000

a. Dependent Variable: Presence or not of LH

What is the weight of association with LH for each of these factors?

Linear Regression Model		Coefficients ^a				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.157	.026		81.477	.000
	Incorrect Rotation	-.349	.013	-.341	-27.881	.000
	Needle Reuse	.026	.011	.028	2.273	.023
	Years on Insulin	-.008	.001	-.146	-11.987	.000

a. Dependent Variable: Presence or not of LH



What is the weight of association with LH for each of these factors?

Linear Regression Model		Coefficients ^a				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.157	.026		81.477	.000
	Incorrect Rotation	.549	.013	-.341	-27.281	.000
	Needle Reuse	.026	.011	.028	2.272	.023
	Years on Insulin	-.008	.001	-.146	-11.987	.000

a. Dependent Variable: Presence or not of LH

Findings

Risk Factors:

- Risk factors for LH are:
 - incorrect rotation of injection sites,
 - using smaller injecting zones,
 - more years on insulin and
 - reusing pen needles.

Findings

Risk Factors:

- The higher the number of times the pen needle is reused the more frequently reported is the LH.
- By Linear Regression analysis, incorrect rotation and years on insulin are the most important factors associated with LH ($p < 0.001$), while pen needle reuse is significantly, but slightly less strongly associated ($p = 0.023$).

Is Needle Length associated with Nurse-Reported Reuse?

		Needle Length			
		4	5	6	8
Reuse	Yes	898	791	832	1158
	%	41.3%	50.2%	53.6%	55.0%
	No	1277	786	721	948
	%	58.7%	49.8%	46.4%	45.0%

p < 0.000

In patients who do reuse, is Needle Length associated to the Frequency of Nurse-Reported Reuse?

Times Needle Used	Needle Length				
	4	5	6	8	Total
2	346	242	226	324	1138
%	38.2%	30.0%	26.8%	27.8%	30.6%
3-5	349	327	356	496	1528
%	38.6%	40.6%	42.2%	42.5%	41.1%
6-10	118	118	152	198	586
%	13.0%	14.6%	18.0%	17.0%	15.7%
>10	92	119	110	148	469
%	10.2%	14.8%	13.0%	12.7%	12.6%

More than all the rest

Less than all the rest

p < 0.000

Is the 4 mm needle associated with less frequent reuse? If so, why? Could it be related to better patient adherence?

Is Needle Length associated with Patient-Reported Reuse?

		Needle Length			
		4	5	6	8
Reuse	Yes	902	790	639	902
	%	42.9%	52.1%	52.9%	52.3%
	No	1201	726	569	822
	%	57.1%	47.9%	47.1%	47.7%

p < 0.000

In patients who do reuse, is Needle Length associated to the Frequency of Patient-Reported Reuse?

Times Needle Used	Needle Length				Total
	4	5	6	8	
2	338	229	151	276	994
%	37.0%	28.4%	23.0%	29.3%	30.0%
3-5	360	320	278	378	1336
%	39.4%	39.7%	42.4%	40.2%	40.3%
6-10	119	128	132	154	533
%	13.0%	15.9%	20.1%	16.4%	16.1%
>10	97	130	95	133	455
%	10.6%	16.1%	14.5%	14.1%	13.7%

More than all the rest

Less than all the rest

p < 0.000

Is the 4 mm needle associated with less frequent reuse? If so, why? Could it be related to better patient adherence?

Is Gauge associated to Pen Needle Reuse (patient reported)?

		Needle Gauge			
		29	30	31	32
Reuse	Yes	24	308	1212	870
	%	48.0%	52.8%	54.8%	45.1%
	No	26	275	998	1060
	%	52.0%	47.2%	45.2%	54.9%

Less PN reuse with 32 gauge, $p < 0.000$

Is Gauge associated to Pen Needle Reuse (nurse reported)?

		Needle Gauge			
		29	30	31	32
Reuse	Yes	60	406	1522	889
	%	35.7%	54.0%	57.4%	44.6%
	No	108	346	1131	1103
	%	64.3%	46.0%	42.6%	55.4%

Less PN reuse with 32 gauge, $p < 0.000$

Is Gauge associated to Syringe Reuse?

		Needle Gauge			
		29	30	31	32
Reuse	Yes	38	144	442	110
	%	28.1%	45.6%	48.3%	24.4%
	No	97	172	473	340
	%	71.9%	54.4%	51.7%	75.6%

Less syringe reuse with 32 gauge, $p < 0.000$

**COMPARATIVE
STATISTICS: OUTCOMES**

Is pain associated with reusing needles?

		Pain	
		Yes	No
Reuse	Yes	2057	1658
	%	55.4%	44.6%
	No	1702	2046
	%	45.4%	54.6%

p < 0.000

Is pain associated with number of times needle is used?

		Pain	
		Yes	No
Number of times Needle Used	2	588	534
	%	52.4%	47.6%
	3-5	863	704
	%	55.1%	44.9%
	6-10	362	246
	%	59.5%	40.5%
	>10	298	176
	%	62.9%	37.1%

p < 0.000

Is frequency of pain associated with number of times needle used?

		Frequency of Pain			
		Always	Often	Sometimes	Almost Never
Number of times Needle Used	2	33	143	341	222
	%	4.5%	19.4%	46.1%	30.0%
	3-5	31	153	541	287
	%	3.1%	15.1%	53.5%	28.4%
	6-10	13	54	229	107
	%	3.2%	13.4%	56.8%	26.6%
	>10	15	61	175	80
	%	4.5%	18.4%	52.9%	24.2%

Percent of 'Almost Never' declines as reuse increases

p = 0.011

Is reusing needles associated with Unexplained Hypoglycemia?

		Reuse	
		Yes	No
Unexplained Hypos	Yes	895	661
	%	57.5%	42.5%
	No	3090	3380
	%	47.8%	52.2%

p < 0.000

Is reusing needles associated with Glycemic Variability?

		Reuse	
		Yes	No
Glycemic Variability	Yes	1562	1269
	%	55.2%	44.8%
	No	2412	2768
	%	46.6%	53.4%

p < 0.000

Is reusing needles associated with Injecting through Clothes?

		Reuse	
		Yes	No
Inject thru Clothes	Yes	411	223
	%	64.8%	35.2%
	No	3612	3860
	%	48.3%	51.7%

p < 0.000

Is reusing needles associated with Skipping Injections?

		Reuse	
		Yes	No
Skip Injections	Yes	2163	1748
	%	55.3%	44.7%
	No	1846	2349
	%	44.0%	56.0%

p < 0.000

Is reusing needles associated with bleeding?

		Reuse	
		Yes	No
Bleeding	Yes	2418	2216
	%	52.2%	47.8%
	No	1582	1867
	%	45.9%	54.1%

p < 0.000

Is reusing needles associated with hyperglycemia?

		Reuse	
		Yes	No
Hypers	Yes	2089	1859
	%	52.9%	47.1%
	No	1853	2154
	%	46.2%	53.8%

p < 0.000

Is reuse associated with correct rotation?

		Reuse	
		Yes	No
Correct Rotation	Yes	2561	3014
	%	45.9%	54.1%
	No	1379	919
	%	60.0%	40.0%

p < 0.000

Is reuse associated with HbA1c?

Reuse	Mean HbA1c	N	SD
Yes	8.58	3717	2.404
No	8.36	3821	1.858
Total	8.47	7538	2.148

$\Delta = 0.22$

$p < 0.000$

Is Reuse associated with number of Fingersticks/day?

		Reuse	
		Yes	No
Fingersticks/ Day	>4/day	561	958
		36.9%	63.1%
	3-4/day	797	1152
		40.9%	59.1%
	1-2/day	876	1018
		46.3%	53.7%
	Several/week	1016	657
		60.7%	39.3%
	Rarely/Never	613	235
		72.3%	27.7%

p < 0.000

Is reusing needles associated with Leakage from Site?

		Reuse	
		Yes	No
Leakage from Site	Yes	1527	1462
	%	51.1%	48.9%
	No	2471	2582
	%	48.9%	51.1%

p = 0.059

Is reusing needles associated with Hypoglycemia?

		Reuse	
		Yes	No
Hypos	Yes	2299	2306
	%	49.9%	50.1%
	No	1714	1795
	%	48.8%	51.2%

p = 0.336

Is Reuse associated with Who gave you injection training?

	Reuse	
Educator	Yes	No
General Nurse	768	635
%	54.7%	45.3%
Diabetes Nurse	1652	2403
%	40.7%	59.3%
Diabetes Educator	571	454
%	55.7%	44.3%
GP	271	93
%	74.5%	25.5%
Diabetologist	480	194
%	71.2%	28.8%
Pharmacist	106	33
%	76.3%	23.7%
Industry	74	18
%	80.4%	19.6%

p < 0.000

Conclusions (1)

- About half of patients worldwide use their needle more than once. Syringe users tend to reuse more than pen users.
- There is huge variability across countries in this practice. There is also a huge amount of variability in terms of the times a needle is used.
- Most reuse is 5 times or less, but up to 30% of reusers use the needle 6 times or more.
- The following groups tend to reuse more frequently than others: males, T2DM patients, adults (more than children or adolescents) and those taking multiple daily injections.

Conclusions (2)

- LH is more frequent in needle reusers but reuse is less powerful a factor than incorrect rotation, smaller injection areas and longer time on insulin in multi-variant analysis.
- Use of the 4 mm needle is associated with less needle reuse and less LH.
- Pain is also associated with needle reuse and seems to increase as a function of the number of times the needle is reused.
- Needle reuse seems to be lower with 32 G needles (of any length) for reasons which are not understood.

Conclusions (3)

- Reuse is associated with unexplained hypoglycemia, glycemic variability, injecting through clothes, skipping injections, bleeding, hyperglycemia, incorrectly rotating sites, less frequent fingersticks and slightly higher HbA1c levels; although a causative relationship with any of these has not been established.
- Reuse is not associated with leakage from the skin or routine hypoglycemic reactions.
- Interestingly, reuse is less frequent when General Nurses, Diabetes Nurses or Diabetes Educator gave injection training than when Doctors, Pharmacists or representatives of Industry did it.