

*Injection Techniques Questionnaire (ITQ)
WorldWide Results*

2014-2015

Lipohypertrophy



DESCRIPTIVE STATISTICS

What do patients say about Lipos?

Do you have any swelling or lumps under the skin at your usual injection sites that have been there for some time (weeks, months or years)?

Answer	N	%
Yes	3855	29.0
No	9334	70.2
Total	13189	99.2

How does this compare to the last ITQ?

Do you have any swelling or lumps under the skin at your usual injection sites that have been there for some time (weeks, months or years)?

Answer	% 2014	% 2009
Yes	29.0	47.9
No	70.2	52.1
Total	99.2	100

But the question was posed quite differently in 2009:

Have you ever noticed swelling of fatty tissue or small bumps at your injection sites?

What LH frequency did nurses find on exam by site?

SITE	EXAM TYPE	% lipos found
ABDOMEN	Visual	17.3
	Palpation	21.1
THIGH	Visual	9.8
	Palpation	11.2
BUTTOCKS	Visual	2.1
	Palpation	2.8
ARM	Visual	11.2
	Palpation	13.4

Overall, the nurse found lipohypertrophy in 30.8% of patients

How does this compare to the previous ITQ?

SITE	EXAM TYPE	% 2014	% 2009*
ABDOMEN	Visual	17.3	20.7
	Palpation	21.1	
THIGH	Visual	9.8	15.9
	Palpation	11.2	
BUTTOCKS	Visual	2.1	6.2
	Palpation	2.8	
ARM	Visual	11.2	12.3
	Palpation	13.4	

* Visual and Palpation combined in 2009

Overall, the nurse found lipohypertrophy in 24% of patients in 2009

Do the patients' reports of lipos match the nurses' findings?

SITE	EXAM TYPE	% lipos	Patients report lipos at these sites (%)*
ABDOMEN	Visual	17.3	60.0
	Palpation	21.1	
THIGH	Visual	9.8	12.3
	Palpation	11.2	
BUTTOCKS	Visual	2.1	1.2
	Palpation	2.8	
ARM	Visual	11.2	10.2
	Palpation	13.4	

*percentages don't add to 100 because patients report abnormalities at several sites (e.g. 7.1% of patients say they have lipos on both the abdomen and thigh)

How often do patients say they inject into lipos?

Frequency	%
Always	8.3
Sometimes	31.2
Never	60.4

Why do they inject into lipos?

Reason	%
It's convenient	11.3
It's less painful	16.8
Just a habit (I always inject there)	30.8
Don't know	28.0

Size of Lipos in mm as measured by Nurse (longest dimension)

	N	Mean	SD	Minimum	Maximum
SIZE ABDOMINAL LIPOS (mm)	1320	44.5	36.1	2	300
SIZE THIGH LIPOS (mm)	487	41.9	36.9	1	300
SIZE BUTTOCKS LIPOS (mm)	54	49.7	52.7	10	350
SIZE ARM LIPOS (mm)	393	35.7	26.5	2	300

For the lipos found by the nurse, was there evidence the patient was still injecting into it? If so, how frequently?

Still Injecting into Lipos?	N	%
Yes	1775	44.0
No	2263	56.0

Frequency	%
Every injection	16.7
Frequently (daily)	39.5
Occasionally (weekly)	30.3
Seldom (monthly)	13.5

COMPARATIVE STATISTICS

Are there differences in LH frequency amongst the different DM types?

	LIPO		Total
	Yes	No	
T1DM	1084	1450	2534
%	(42.8%)	(57.2%)	(100.0%)
T2DM	1244	3682	4926
%	(25.3%)	(74.7%)	(100.0%)
GDM	1	77	78
%	(1.3%)	(98.7%)	(100.0%)
Total	2329	5209	7538
%	(30.9%)	(69.1%)	(100.0%)

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What is the correlation between visible LH and palpable LH?

		Visible	
		No	Yes
Palpable	No	5112	23
	%	97.1%	.4%
	Yes	186	1102
	%	13.0%	76.8%

- 77% are both visible and palpable
Data from **Abdomen** (site with highest % of LH)

What is the correlation between visible LH and palpable LH?

		Visible	
		No	Yes
Palpable	No	5112	23
	%	97.1%	.4%
	Yes	186	1102
	%	13.0%	76.8%

- 13% can be palpated but not seen
Data from **Abdomen** (site with highest % of LH)

What is the correlation between visible LH and palpable LH?

		Visible	
		No	Yes
Palpable	No	5112	23
	%	97.1%	.4%
	Yes	186	1102
	%	13.0%	76.8%

- Only 0.4% can be seen but not palpated
Data from **Abdomen** (site with highest % of LH)

Is it the same in the thigh, arm and buttocks?

		Visible	
		No	Yes
Palpable	No	4126	9
	%	98.0%	.2%
	Yes	66	421
	%	12.3%	78.7%

		Visible	
		No	Yes
Palpable	No	3125	6
	%	97.1%	.2%
	Yes	53	393
	%	10.5%	77.7%

		Visible	
		No	Yes
Palpable	No	2142	2
	%	99.7%	.1%
	Yes	15	42
	%	25.9%	72.4%

Yes,
especially in
Buttocks

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Is the frequency of LH associated with the number of injections/day?

Number of Injections a day	Lipohypertrophy	
	Yes	No
1	180 15.7%	969 84.3%
2	508 24.9%	1529 75.1%
3	265 31.5%	575 68.5%
4	900 36.7%	1549 63.3%
5	267 44.6%	331 55.4%
6	89 52.0%	82 48.0%
7	35 56.5%	27 43.5%
>7	17 29.8%	40 70.2%
Total	2261 30.7%	5102 69.3%

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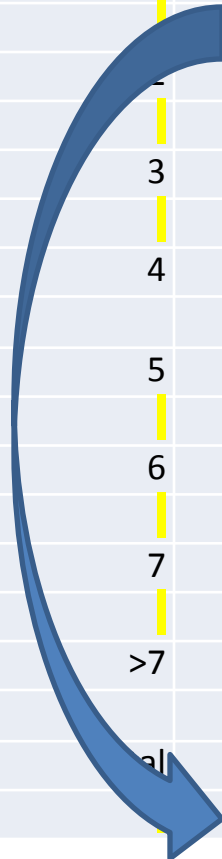
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Half of mean



15.7%

30.7%

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Nearly double the mean



What is the association between LH and number of years with DM?

LH	Mean years with DM	N
Yes	14.4	2251
No	12.5	4784
Total	13.1	7035

T1DM

LH	Mean years with DM	N
Yes	14.2	1034
No	12.6	1296
Total	13.3	2330

T2DM

LH	Mean years with DM	N
Yes	14.6	1186
No	12.5	3403
Total	13.1	4589

What is the association between LH and number of years on insulin?

LH	Mean years on insulin	N
Yes	10.6	1992
No	7.5	4155
Total	8.5	6147

T1DM

LH	Mean years on insulin	N
Yes	14.3	884
No	11.9	1189
Total	12.9	2073

T2DM

LH	Mean years on insulin	N
Yes	7.6	1083
No	5.8	2896
Total	6.3	3979

Is there an association between the presence of LH and BMI?

T1DM

LH	Mean BMI	N
Yes	23.8	961
No	23.7	1332
Total	23.7	2293

p=0.825

T2DM

LH	Mean BMI	N
Yes	30.3	1184
No	29.9	3569
Total	30.0	4753

p=0.083

Findings

Frequency:

- LH is present in nearly 1/3 of survey subjects worldwide.
- LH is seen more frequently in T1DM than in T2DM and is virtually absent in GDM, presumably because of the very short time injecting insulin.
- Its frequency is relatively consistent across the 42 countries surveyed.

Lipo Percentages by Country (1)

Country	YES	NO	Number
USA	6.9	93.1	304
Canada	28.8	71.2	281
Russia	24.0	76.0	104
South Africa	34.8	65.2	155
Netherlands	40.8	59.2	76
Belgium	33.1	66.9	136
France	36.2	63.8	224
Spain	60.2	39.8	196
Italy	39.4	60.6	310
Switzerland	29.1	70.9	55
Austria	28.4	71.6	95

Lipo Percentages by Country (2)

Country	YES	NO	Number
UK	40.9	59.1	445
Denmark	20.0	80.0	35
Sweden	56.4	43.6	101
Poland	17.8	82.2	101
Germany	34.3	65.7	458
Perú	.0	100.0	19
Mexico	32.8	67.2	119
Argentina	65.3	34.7	72
Brazil	27.5	72.5	244
Chile	25.0	75.0	20
Colombia	25.0	75.0	20

Lipo Percentages by Country (3)

Country	YES	NO	Number
Venezuela	23.8	76.2	21
Malaysia	43.9	56.1	41
Australia	40.0	60.0	80
Indonesia	6.3	93.8	128
Philippines	24.3	75.7	70
Singapore	47.6	52.4	21
S. Korea	42.5	57.5	179
China	25.0	75.0	496
Turkey	27.4	72.6	1295
India	21.9	78.1	873
Ireland	54.1	45.9	37

Lipo Percentages by Country (4)

Country	YES	NO	Number
Finland	49.0	51.0	96
Czech Republic	59.8	40.2	82
Nicaragua	0	100.0	16
Ecuador	18.2	81.8	22
Taiwan	12.4	87.6	97
Saudi Arabia	36.4	63.6	431
United Arab Emirates	29.4	70.6	102

Findings

Associations:

- LH is associated with
 - giving more injections per day,
 - a longer number of years with DM and
 - a longer number of years on insulin.
- However there is no association between the presence of LH and BMI.

Is there an association between the presence of LH and length of time on GLP1s?

Years on GLP1s

LH	Mean Years	N
Yes	2.3	43
No	2.7	147
Total	2.6	190

p=0.304

Months on GLP1s

LH	Mean Months	N
Yes	4.0	22
No	3.2	89
Total	3.4	111

p=0.285

Findings

Associations:

- There is also no association between LH and length of time taking GLP1s.
- Just under 1/3 of those taking GLP1s were found to have LH, but it is unclear if the LH predated the start of the GLP1.
- The fact that there is no association to the length of time on a GLP1 suggests the LH is not linked to the GLP1.

What is the association between LH and the total daily dose of insulin (TDD)?

LH	Mean TDD	N	SD
Yes	55.2	2192	33.0
No	45.1	4889	31.5
Total	48.2	7081	32.3

$\Delta = 10.2 \text{ IU}$

T1DM

T2DM

LH	Mean TDD	N	SD
Yes	51.2	1007	25.9
No	45.9	1286	24.5
Total	48.2	2293	25.3

$\Delta = 5.4 \text{ IU}$

LH	Mean TDD	N	SD
Yes	58.8	1159	38.0
No	45.2	3457	33.6
Total	48.6	4616	35.2

$\Delta = 13.5 \text{ IU}$

p for all <0.000

What is the association between Injecting into LH and TDD?

Inject into LH	Mean TDD	N	SD
Yes	56.1	1644	33.2
No	47.1	2064	32.2
Total	51.1	3708	32.9

$\Delta = 9.0$ IU

$p < 0.000$

What is the association between LH and the TDD by Insulin type?

Rapid Analogues

LH	Mean TDD	N	SD
Yes	34.4	928	22.0
No	29.9	884	21.6
Total	32.2	1812	21.9

$\Delta = 4.5 \text{ IU}$

Basal Analogues

LH	Mean TDD	N	SD
Yes	28.7	1149	19.0
No	27.2	1228	22.0
Total	27.9	2377	20.6

$\Delta = 1.5 \text{ IU}$

Premixes

LH	Mean TDD	N	SD
Yes	49.9	319	30.2
No	40.0	479	22.9
Total	44.0	798	26.5

$\Delta = 9.8 \text{ IU}$

p for all <0.000

Findings

Insulin Consumption:

- Strong association between the presence of LH and the total daily dose (TDD) of insulin, with over 10 IU of insulin on average being consumed in the LH+ population vs LH-.
 - In T2DM patients, this average TDD difference is 13.5 IU.
 - In T1DM patients, the average TDD difference is 5.4 IU.

Findings

Insulin Consumption:

- These differences were seen for different types of insulin:
 - fast-acting analogue (mean of 4.4 IU more),
 - basal analogue (mean of 1.5 IU more)
 - and premix (mean of 9.8 IU more).

Findings

Insulin Consumption:

- All currently used families of insulins are associated with the risk of LH.
- It is difficult to determine if any one type of insulin has higher risks.
- Even newer analogues show a prevalence of LH in double digits

What is the association between LH and HbA1c?

LH	Mean HbA1c	N	SD
Yes	8.85	2205	2.7
No	8.30	4795	1.9
Total	8.47	7000	2.2

$\Delta = 0.55$

T1DM

T2DM

$\Delta = 0.54$

LH	Mean HbA1c	N	SD
Yes	8.80	1034	1.9
No	8.26	1343	1.9
Total	8.49	2377	1.9

LH	Mean HbA1c	N	SD
Yes	8.90	1142	3.2
No	8.37	3303	1.8
Total	8.51	4445	2.3

$\Delta = 0.53$

p for all <0.000

Is HbA1c associated with injecting into LH?

Inject into LH	Mean HbA1c	N	SD
Yes	8.91	1660	2.0
No	8.36	1968	1.7
Total	8.61	3628	1.9

$\Delta = 0.55$

$p < 0.000$

Is HbA1c associated with correct rotation?

Correct Rotation	Mean HbA1c	N	SD
Yes	8.28	5187	1.787
No	8.85	2123	2.012
Total	8.44	7310	1.873

$\Delta = 0.53$

$p < 0.000$

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 LH associated with Patient-reported Hypoglycemia?

LH		Hypos	
		Yes	No
Yes	1620	719	
%	69.3%	30.7%	
No	2649	2566	
%	50.8%	49.2%	

p < 0.000

Is LH associated with Patient-reported hospitalizations for Hypoglycemia?

3.5% higher risk for this very high cost complication

		Hospitalization for Hypos	
		Yes	No
LH	Yes	205	1691
	%	10.8%	89.2%
No	No	274	3492
	%	7.3%	92.7%

p < 0.000

Is LH associated with Patient-reported diabetic ketoacidosis (DKA)?

Nearly double
risk for this
very costly
complication


LH		DKA	
		Yes	No
Yes	Yes	604	1695
	%	26.3%	73.7%
No	No	758	4374
	%	14.8%	85.2%

p < 0.000

Is the LH/DKA link only applicable to T1DM or also T2DM?

T1DM


		DKA	
		Yes	No
LH	Yes	462	598
	%	43.6%	56.4%
No	Yes	500	905
	%	35.6%	64.4%



p<0.000

T2DM

		DKA	
		Yes	No
LH	Yes	133	1075
	%	11.0%	89.0%
No	Yes	246	3329
	%	6.9%	93.1%



p<0.000

Is LH associated with Patient-reported Hyperglycemia?

LH		Hypos	
		Yes	No
Yes	1452	835	
%	63.5%	36.5%	
No	2209	2908	
%	43.2%	56.8%	

p < 0.000

Is LH associated with Nurse-reported Unexplained Hypoglycemia?


	Unexpected Hypos	
LH	Yes	No
Yes	691	1625
%	29.8%	70.2%
No	751	4384
%	14.6%	85.4%

Essentially
doubles the
risk

p < 0.000

Is LH associated with Nurse-reported Glycemic Variability?

	Glucose Variability	
LH	Yes	No
Yes	1165	1142
%	50.5%	49.5%
No	1442	3689
%	28.1%	71.9%



Essentially
doubles the
risk

p < 0.000

Findings

Glucose Control:

- The presence of LH is associated with higher HbA1c values.
- For T1DM the mean increase is 0.54%. For T2DM the mean increase is 0.53%.
- LH is associated with
 - higher rates of unexplained hypoglycemia and
 - higher rates of glycemic variability as well as
 - more frequent DKA.

Is correct rotation of sites associated with absence of LH?

		Correct Rotation	
		Yes	No
LH	Yes	1023	1238
	%	45.2%	54.8%
	No	4108	966
	%	81.0%	19.0%

4-fold difference

$p < 0.000$

Do some people who correctly rotate still get LH?

Yes, so there must be other factors at play

		Correct Rotation	
		Yes	No
LH	Yes	1023	1238
	%	45.2%	54.8%
	No	1023	966
	%	81.0%	19.0%

p < 0.000

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

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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

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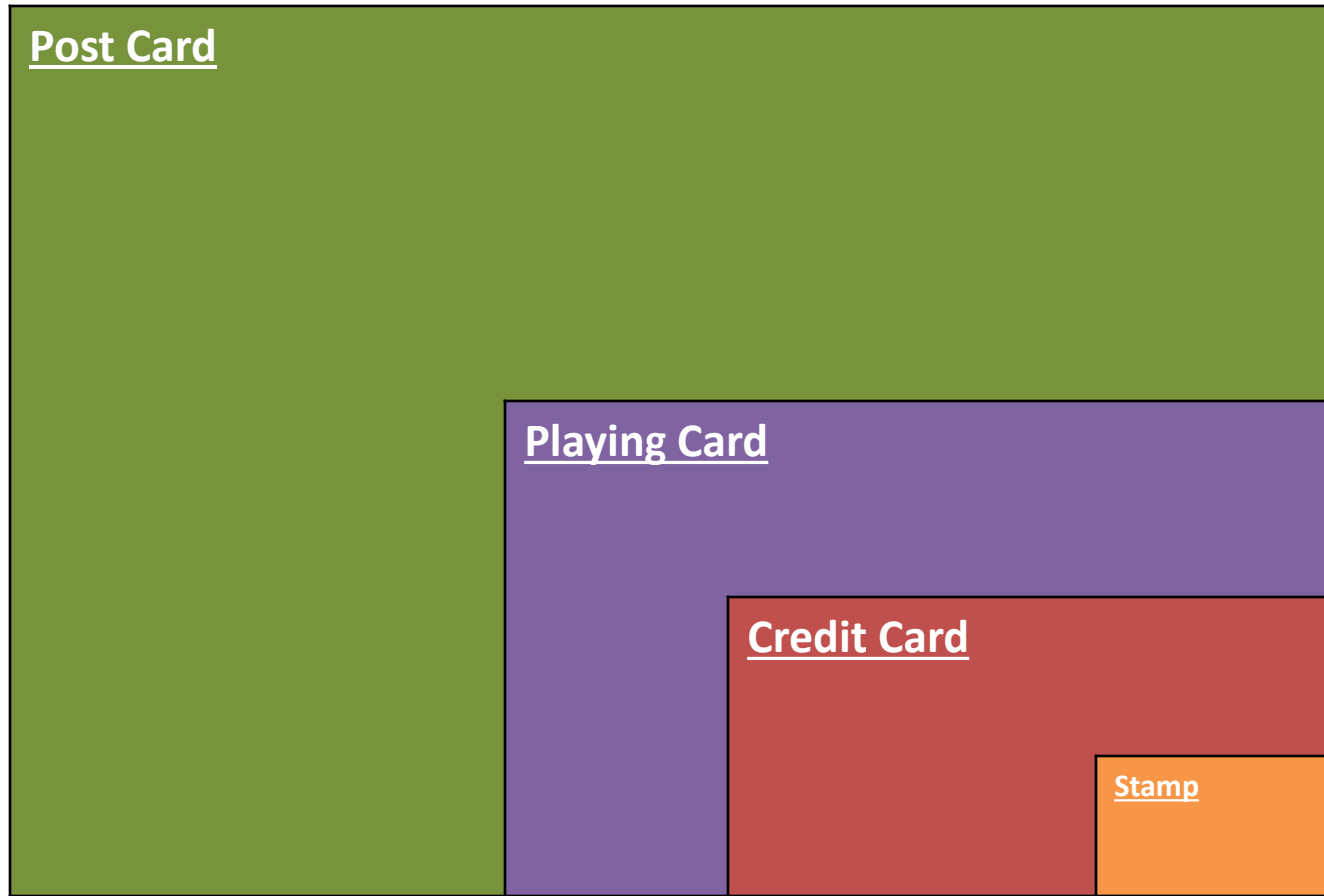
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a. Dependent Variable: Presence or not of LH

Scale used to assess Size of Injection Sites



Is LH associated with the SIZE of the Injecting Zone in the Abdomen?

Size of Injection Area	LH	
	Yes	No
Post Card	1112	2773
	28.6%	71.4%
Playing Card	431	890
	32.6%	67.4%
Credit Card	375	532
	41.3%	58.7%
Stamp	99	168
	37.1%	62.9%
TOTAL	2017	4363
	31.6%	68.4%

p < 0.000

Is LH associated with the SIZE of the Injecting Zone in the Thigh?

Size of Injection Area	LH	
	Yes	No
Post Card	323	843
	27.7%	72.3%
Playing Card	594	1368
	30.3%	69.7%
Credit Card	336	527
	38.9%	61.1%
Stamp	95	145
	39.6%	60.4%
TOTAL	1348	2883
	31.9%	68.1%

p < 0.000

Is LH associated with the SIZE of the Injecting Zone in the Arm?

Size of Injection Area	LH	
	Yes	No
Post Card	95	298
	24.2%	75.8%
Playing Card	253	640
	28.3%	71.7%
Credit Card	396	806
	32.9%	67.1%
Stamp	198	348
	36.3%	63.7%
TOTAL	942	2092
	31.0%	69.0%

p < 0.000

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 LH associated with Patient-reported skipping injections?

		Skipping Injections	
		Yes	No
LH	Yes	1336	989
	%	57.5%	42.5%
No	Yes	2324	2895
	%	44.5%	55.5%

p < 0.000

Is LH associated with sub-optimal site rotation?

Rotation Practices	Lipohypertrophy	
	Yes	No
I move back and forth from right side of my body to left	523 32.5%	1084 67.5%
I move from one injection site to another	521 36.2%	918 63.8%
I inject a finger's breadth (1 cm) from previously injection	257 23.0%	861 77.0%
My injections describe a circle around my injection sites	149 31.4%	326 68.6%
My injections describe lines across my injection sites	54 24.2%	169 75.8%

p < 0.000


Is LH associated with sub-optimal pen needle dwell times under skin?

Dwell Times	Lipohypertrophy	
	Yes	No
< 5 sec	454 38.8%	717 61.2%
5 – 10 sec	886 31.3%	1941 68.7%
> 10 sec	616 27.0%	1665 73.0%
I'm not aware of how long	123 41.4%	174 58.6%

p < 0.000

Is LH associated with Patient-reported injections through clothing?

	LH	
Through Clothing	Yes	No
Yes	277	321
%	46.3%	53.7%
No	2050	4898
%	29.5%	70.5%



p < 0.000

Is LH associated with Patient-reported injections of cold insulin?

		LH	
Allow Cold Insulin to heat up before injection		Yes	No
Yes		915	2490
	%	26.9%	73.1%
No		937	1725
	%	35.2%	64.8%

p < 0.000

Is LH associated with Patient-reported use of insulin after expiry date?

		LH	
		Yes	No
Using Insulin after Expiry Date	Yes	84	163
	%	34.0%	66.0%
	No	1859	4378
	%	29.8%	70.2%
I don't usually keep track of expiry dates on my insulin		368	588
	%	38.5%	61.5%

p < 0.000

Is LH associated with Patient-reported disposal of used sharps?

Disposal of Used Sharps	LH	
	Yes	No
Into a container specially made for used sharps	573 32.3%	1202 67.7%
Into a home container such as an empty bottle	341 26.7%	934 73.3%
Into the rubbish with the cap on	1215 33.5%	2416 66.5%
Into the rubbish without recapping	134 34.4%	255 65.6%
I clip off the needle and it stays in the clipper	38 25.5%	111 74.5%

p < 0.000

Findings

Associations:

- Interestingly there is an association between LH and a number of 'sloppy' injection practices, including
 - poor rotation habits,
 - shorter indwell times,
 - injecting through clothing,
 - injecting insulin cold before it has warmed up,
 - using insulins past their expiry dates and
 - inappropriate disposal of used sharps (all with $p < 0.05$).
- It is difficult to assess the significance of these associations, other than to say they are 'fellow travelers'.

Q & A

- What's the frequency of lipos in the world right now? **30%**
- How does this compare to the last ITQ? **SAME**
- How often do patients with lipos inject into lipos? **40%**
- Why do they do this? **HABIT**
- Are there differences in LH frequency amongst the different DM types? **YES, T1DM MORE**
- What is the correlation between visible and palpable LH? **70%**
- Is the frequency of LH associated with the number of injections/day? **MORE INJECTIONS, MORE LH**

Q & A

- Is there an association between LH and BMI? **NO**
- Is there an association between LH and length of time on insulin? **YES, LONGER = MORE LH**
- Is there an association between LH and being on GLP1s? **NO**
- What is the association between LH and the total daily dose of insulin (TDD)? **LH = 10 IU MORE**
- What is the association between Injecting into LH and TDD? **ALMOST 10 IU MORE**
- What is the association between LH and the TDD by Insulin type? **VARIABLE BUT INCREASED TDD IN ALL**
- What is the association between LH and HbA1c? **LH = 0.5 MORE**
- Is HbA1c associated with injecting into LH? **YES, ALSO 0.5 MORE**

Q & A

- Is LH associated with Hypoglycemia? **YES**
- Is LH associated with hospitalizations for Hypoglycemia? **YES**
- Is LH associated with diabetic ketoacidosis (DKA)? **YES**
- Is LH associated with Hyperglycemia? **YES**
- Is LH associated with Nurse-reported Unexplained Hypoglycemia? **YES**
- Is LH associated with Nurse-reported Glucose Variability? **YES**
- Is correct rotation of sites associated with absence of LH? **YES**
- Do some people who correctly rotate still get LH? **YES**

Q & A

- Is there an association between LH and Reuse of pen needles as reported by patients? **YES**
- Is there an association between LH and Reuse of pen needles as reported by nurses? **YES**
- Is LH associated with the number of times a needle is used? **YES**
- Is the size of LH associated with the number of times a needle is used? **YES**
- Is LH associated with the SIZE of the Injecting Zone? **YES**
- Is LH associated with skipping injections? **YES**
- Is LH associated with sub-optimal site rotation? **YES**
- Is LH associated with sub-optimal pen needle dwell times under skin? **YES**
- Is LH associated with Patient-reported disposal of used sharps? **YES**

Conclusions

1. 1/3 of injecting patients WW currently have LH
2. Of these, 2/5 inject into the LH regularly
3. LH is more frequent in T1DM, those giving more injections/day, long term insulin users, needle reusers and those who don't rotate correctly or inject into broad zones
4. Injecting into LH leads to approximately 20% higher TDD of insulin and about 0.5 higher HbA1c
5. All currently available insulins are associated with LH
6. LH is associated with many sub-optimal practices and with potentially harmful outcomes (hypos, variability, DKA)
7. LH continues at epidemic rates but still commonly goes undetected or untreated