三軍總醫院
Tri-Service General Hospital

實證醫學競賽

組別：第1組

時間：108 年 11月 20日

地點：三軍總醫院

臨床場景

對象	72歲女性/骨關節炎病史
情況	左膝全關節置換術後(TKA)
	術後疼痛，但想選擇非藥物止痛
	術後關節保養
病人/家屬期望	緩解TKA術後疼痛
病人/家屬欲知	TKA術後非藥物治療止痛效果
	維骨力等關節保養藥物是否有效

背景資訊

- 骨關節炎是最常見的關節炎形式，而其最常見的症狀為關節疼痛及活動功能受限，治療方式則以藥物止痛甚至手術治療為主，而手術治療最常見的，則為全膝關節置換術(Total Knee Arthroplasty, TKA)。
- TKA是指切除患病的膝關節表面，並以金屬或是聚乙烯等材料進行關節重建，對於骨關節炎的患者來說，可以有效緩解疼痛及改善生活品質。
- TKA術後病人主要面臨的最大問題便為疼痛及活動功能受限，研究顯示，透過藥物治療及部分非藥物的介入措施，可達到緩解病患疼痛、增進活動功能的效果，生物回饋(biofeedback)即為其中一項。
- Biofeedback是指個人透過自我調節功能，改變其生理狀況，進一步改善身體、心理、精神健康狀況的非藥物治療方式

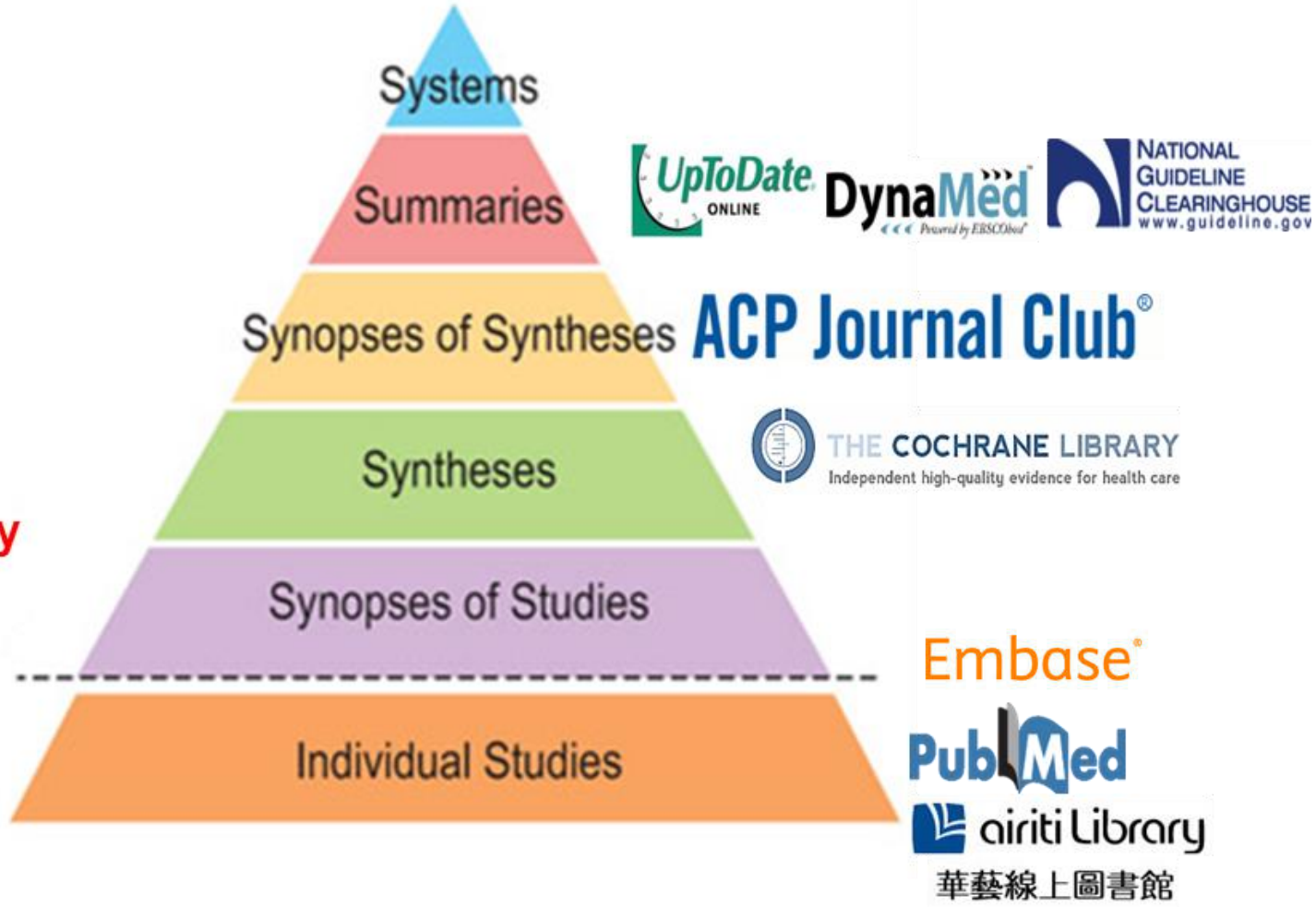
臨床問題

	PICO 1	PICO 2
P	TKA術後病人	TKA術後病人
I	藥物+biofeedback	使用維骨力
C	只有藥物	不使用維骨力
O	疼痛	關節炎發生率
S	Intervention/Therapy	Prognosis

關鍵字

	中文關鍵字(繁/簡)	英文關鍵字	MeSH
P	全關節置換術後/全髋关节置换术后	knee arthroplasty, total; total knee joint replacement; total knee replacement arthroplasty; total knee arthroplasty	Arthroplasty, Replacement, Knee
I	生物回饋/生物回馈	biofeed back; myobiofeedback; psychophysiological feedback	Biofeedback, Psychology
C	-	-	-
O	疼痛	Pain; treatment related pain; acute pain	Pain

搜索策略



- **以「P＆I」搜尋，再依結果調整納入之關鍵字與同義字。**

與臨床場景相符?

Systemic review(SR)

相符!

進行文獻評讀

不相符!

Randomized controlled trial (RCT)

相符!

進行文獻評讀

不相符!

Controlled trial

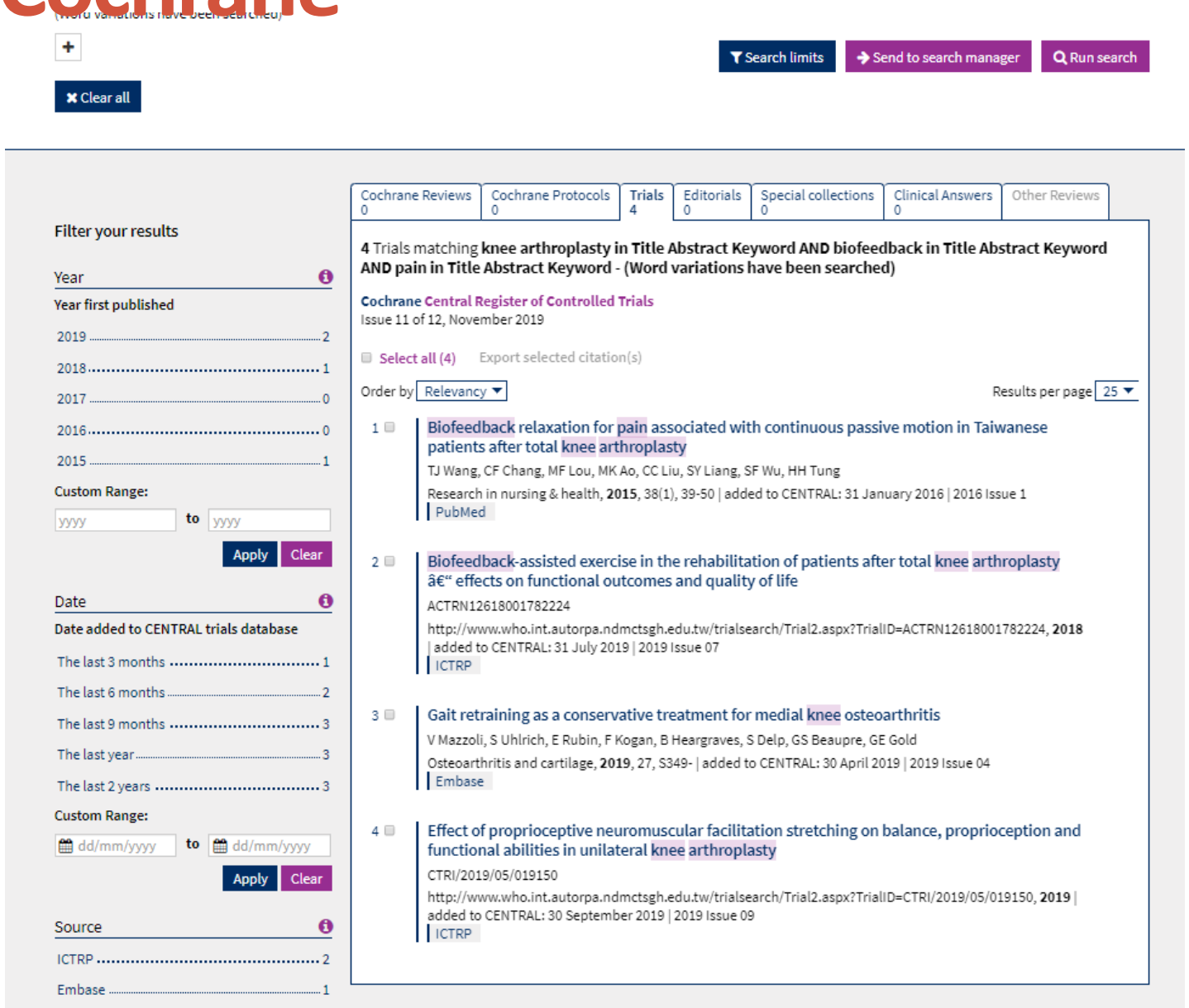
Secondary database: Cochrane

Keyword

使用P、I、O之MeSH terms進行搜尋

搜尋技巧

1. 使用PICO功能搜尋
2. 加入布林邏輯 AND 作搜尋連結
3. Search limit: Trail、年份 2013-2018



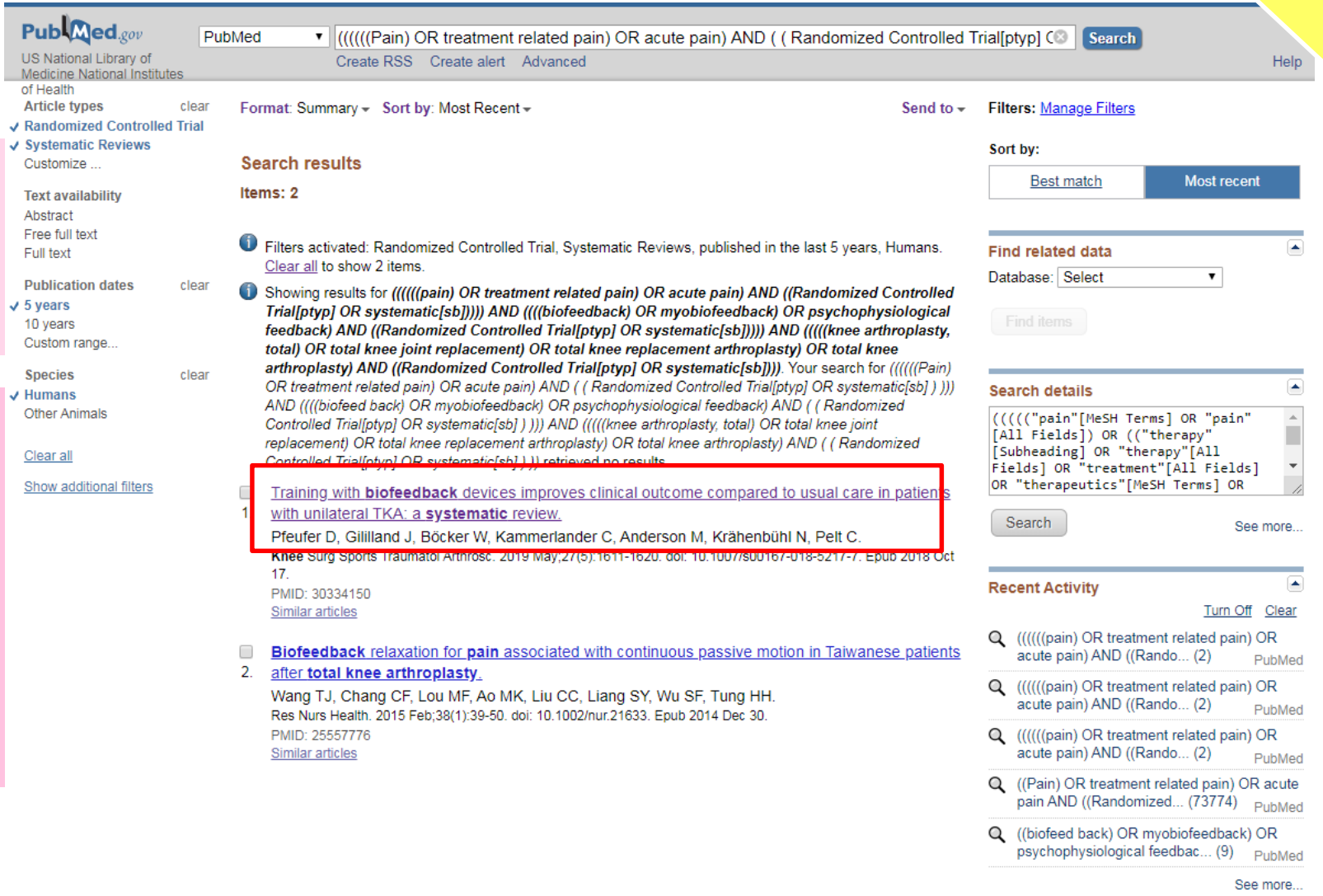
Primary database: PubMed

Keyword

使用P、I、O之MeSH terms進行搜尋

搜尋技巧

1. My NCBI
2. 使用Advanced research搜尋
3. 布林邏輯 AND 作搜尋連結
4. Search limit: SR、RCT、5年內



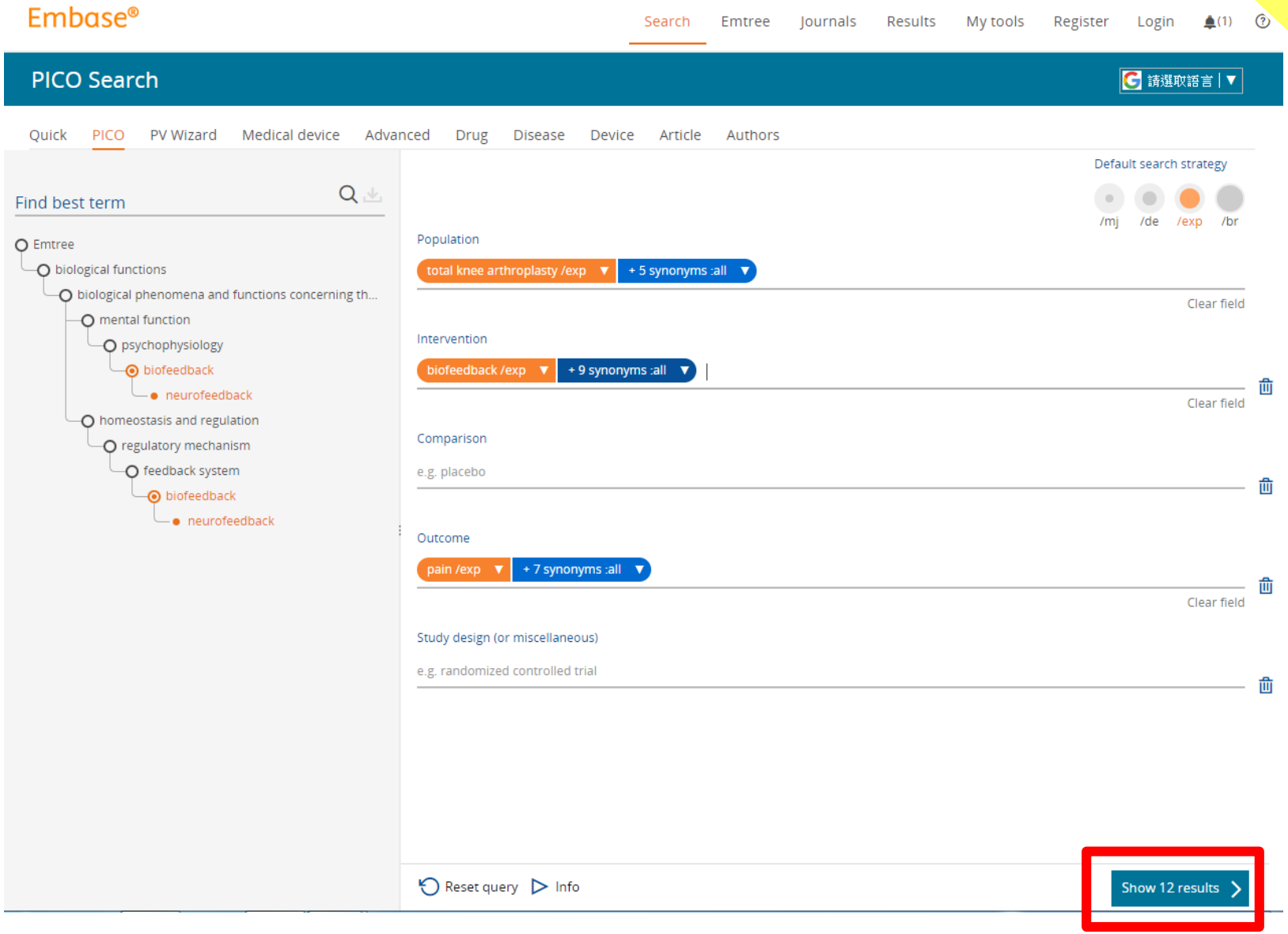
Primary database: EMBASE

Keyword

使用P、I、O之MeSH terms進行搜尋

搜尋技巧

1. 包含所有同義詞
2. 因文章數量只有12篇，故不額外限制年份



Primary database: 華藝線上圖書館

Keyword

使用I進行搜尋

搜尋技巧

Search limit:

1. 中文電子期刊
2. 醫藥衛生學科
3. 2015年以後
4. 限定為台灣期刊

Primary database: 中國知網

Keyword

使用I進行搜尋

搜尋技巧

Search limit:

1. 電子期刊
2. 2015年以後

搜尋結果

CNKI中國知網 www.cnki.net 中国知识基础设施工程	Cochrane Library	PubMed	airiti Library 華藝線上圖書館	Embase
1篇	4篇	2篇	34篇	12篇

1. 使用Mesh Term,布林邏輯 (AND,OR,NOT),語法(如Truncation*)等提升搜尋廣度並初步排除非相關文章
2. Search limit: 未限制年份,文章研究類型
3. 搜尋華文資料庫及亞洲地區研究,比對種族是否影響outcome

✓有電子全文可供閱讀
✓證據等級強弱
✓符合PICO
✓五年內
✓刪除重複文章

符合PICOS：3篇

文章篩選

文章篩選

來源	文章	S	P	I	C	O
PubMed	[2017] The effects of proprioception exercise with and without visual feedback on the pain and balance in patients after total knee arthroplasty	●	●	●	●	●
PubMed	[2019] Training with biofeedback devices improves clinical outcome compared to usual care in patients with unilateral TKA: a systematic review.	●	●	●	●	●
EMBASE	[2015] Biofeedback relaxation for pain associated with continuous passive motion in Taiwanese patients after total knee arthroplasty.	●	●	●	●	●

篩選結果

KNEE

Training with biofeedback devices improves clinical outcome compared to usual care in patients with unilateral TKA: a systematic review

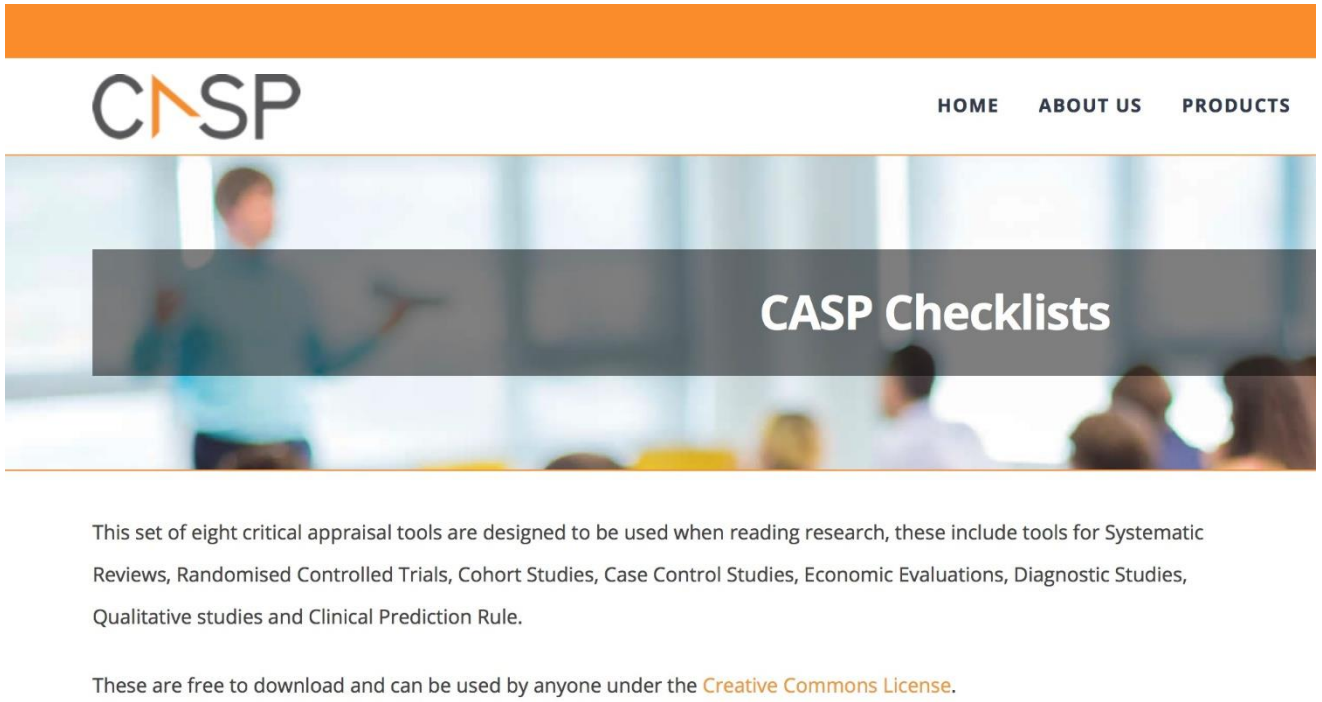
Daniel Pfeufer[1,2] · Jeremy Gililland[1] · Wolfgang Böcker[2] · Christian Kammerlander[2] · Mike Anderson[1] · Nicola Krähenbühl[1] · Christopher Pelt[1]

Received: 16 July 2018 / Accepted: 12 October 2018 / Published online: 17 October 2018

- ✓最符合臨床問題
- ✓發表年份較新
- ✓最佳的研究設計
- ✓有全文可供評讀

正確使用文獻評讀指南工具

我們的文獻評讀工具是 NHS CASP SR critical appraisal tool !!



選用評讀工具理由

- ✓簡單扼要
- ✓國際廣泛運用
- ✓可適用於多種研究設計

1. DID THE REVIEW ADDRESS A CLEARLY FOCUSED QUESTION?
此研究是否問了一個清楚明確的問題?

Training with biofeedback devices improves clinical outcome compared to usual care in patients with unilateral TKA: a systematic review

Daniel Pfeufer[1,2] · Jeremy Gililland[1] · Wolfgang Böcker[2] · Christian Kammerlander[2] · Mike Anderson[1] · Nicola Krähenbühl[1] · Christopher Pelt[1]

Received: 16 July 2018 / Accepted: 12 October 2018 / Published online: 17 October 2018

Abstract

Purpose Biofeedback following total knee arthroplasty (TKA) seems to be a feasible approach to improve rehabilitation, outcomes, mobility and reduce pain. This systematic review gives the practicing orthopedic surgeon a summary of what is available and how biofeedback affects clinical outcomes.

Methods We reviewed the current literature regarding methods, devices and effects of biofeedback in patients who underwent total knee arthroplasty. Embase, Pubmed, Web of Science, and Cochrane Central Register of Controlled Trials were searched from inception to May 2018 for the following keywords: Biofeedback OR Feedback AND Total Knee Arthroplasty OR TKA. Data were extracted according to a predefined setting (see Protocol for systematic review on PROSPEO). Devices used for biofeedback were recorded. Demographics, training methods and effects were also collected.

Results The search resulted in 380 potentially eligible studies from which 11 met all inclusion criteria including 7 randomized controlled trials (RCTs), 3 cohort studies, and 1 cross-sectional study. A total of 416 patients with unilateral TKA were included, with an average of 37.8 patients per study. In patients with TKA, significant improvements in activity scores or pain were reported by 9 of 11 studies. Only two of the studies reported no significant influence of the feedback on the chosen outcome parameters. Devices for biofeedback varied between studies and included the use of a goniometer, force plate, balance board, treadmill, and/or electromyography (EMG). The most common type of feedback was visual followed by audio, with one study mentioning that the audio mode was preferred by the patients as it was easier to handle. Overall, 5 out of 6 different methods demonstrated a potential value for improving mobility and decreasing pain.

Conclusions This review suggests that biofeedback in early postoperative rehabilitation after TKA is effective in improving gait symmetry, reducing pain and increasing activity level. It should be noted that the great variety of devices used for feedback limits comparisons between studies.

Level of evidence IIa.

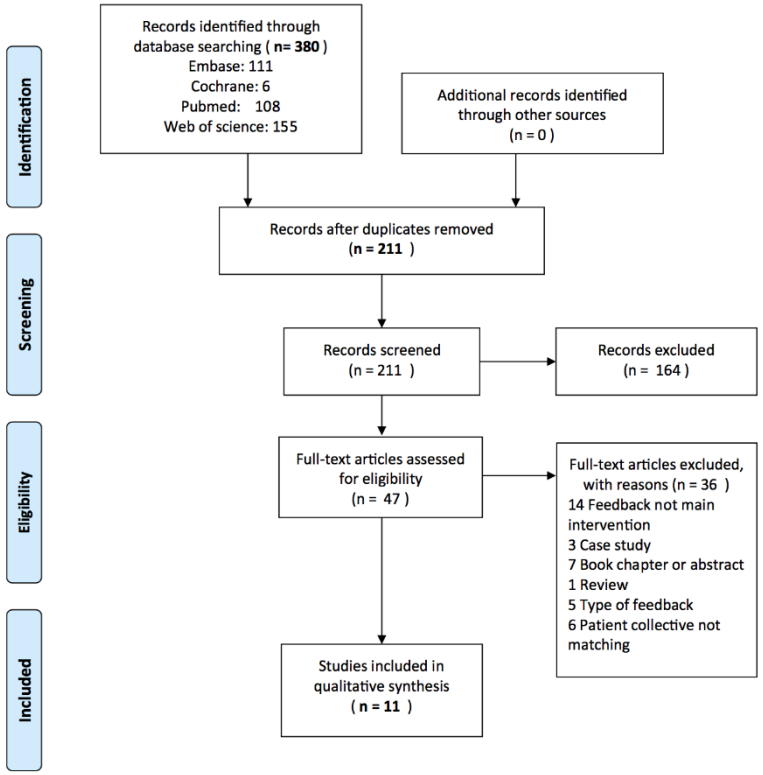
Yes | **No** | **Can't tell**

Ⓟ Patients with Unilateral TKA
Ⓘ Training with Biofeedback Devices
Ⓒ Usual Care
Ⓞ Clinical Outcome (eg. Activity Scores or Pain)

2. DID THE AUTHORS LOOK FOR THE RIGHT TYPE OF PAPERS?
作者是否收納適當的研究類型？

Yes **No** **Can't tell**

Fig. 1 PRISMA Flow diagram of search strategy



作者排除沒有全文，及生物回饋非主要措施、患者病情不相符等，收納文獻等級較高的**RCT**、**Cohort**、**Cross-sectional** 文章，共有 11 篇。

3. DO YOU THINK ALL THE IMPORTANT, RELEVANT STUDIES WERE INCLUDED?

作者有沒有可能遺漏掉重要、相關的研究？

Yes　　No　　Can't tell

The following databases were searched on May 2, 2018: Pubmed, Embase, Cochrane Library, Web of Science.

Search strategy for all above mentioned databases:

1. Biofeedback OR Feedback
   AND
2. Total knee arthroplasty OR TKA

The language was not restricted at this stage, but during screening was limited to English papers only. No limits or other restrictions were used for this search.

Titles and abstracts were screened by the main author and selected for the review. The results were discussed by the team to ensure that no abstracts had been excluded unnecessarily. The full text of these articles was retrieved and assessed by two reviewers (D.P. and N.K.) according to predefined inclusion criteria. Disagreements between the two independent reviewers were discussed and a final consensus reached.

1. 搜尋資料庫：Pubmed、Embase、Cochrane Library、Web of Science
2. 搜尋日期為2018年5月2日前
3. 沒有限制文章類型
4. 使用free text以及布林字元搜索，無使用MeSH term
5. 未收錄未發表之文章？
6. 語言：只有英文？

4. DID THE REVIEW'S AUTHORS DO ENOUGH TO ASSESS QUALITY OF THE INCLUDED STUDIES?
作者是否有評估收納研究的品質？

2. Total knee arthroplasty OR TKA

The language was not restricted at this stage, but during screening was limited to English papers only. No limits or other restrictions were used for this search.

Titles and abstracts were screened by the main author and selected for the review. The results were discussed by the team to ensure that no abstracts had been excluded unnecessarily. The full text of these articles was retrieved and assessed by two reviewers (D.P. and N.K.) according to predefined inclusion criteria. Disagreements between the two independent reviewers were discussed and a final consensus reached.

1. 二位評審員（ D. P. andN. K. ）根據標題和摘要是否符合criteria進行首次篩選。
2. 全文由兩位評審員（ D. P. andN. K. ）進行獨立評估。
3. 若以上兩者意見相左，則由共同討論解決分歧。

4. DID THE REVIEW'S AUTHORS DO ENOUGH TO ASSESS QUALITY OF THE INCLUDED STUDIES?

作者是否有評估收納研究的品質？

Yes　No　Can't tell

Table 2 Down and black checklist for methodologic quality

#	Author year	Reporting item										External validity			Internal validity—bias							Internal validity—confounding (selection bias)							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	Total
1	Christensen J 2018	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	0	1	0	0	1	1	5	**25**
2	Christiansen C 2015	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	1	5	**26**
3	Fung V 2012	1	1	1	1	0	1	0	0	0	1	1	1	1	0	1	1	0	1	1	1	1	1	1	0	0	0	5	**22**
4	Hardt S 2018	1	1	1	1	0	1	1	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	1	0	0	0	5	**24**
5	Kuiken T 2004	1	1	1	0	0	1	0	0	0	1	1	0	1	0	0	1	0	1	1	1	1	1	0	0	0	0	5	**18**
6	Oh H 2017	1	1	1	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	1	1	1	1	1	0	0	0	5	**16**
7	Paxton R 2018	1	1	1	1	0	1	0	0	1	1	1	1	1	0	0	0	0	1	0	1	1	1	1	0	0	0	5	**20**
8	Shanb A 2014	1	1	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	1	1	1	1	1	1	0	1	0	5	**22**
9	Wang T 2014	1	1	1	1	2	1	0	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	0	1	1	5	**27**
10	Wilk M 2010	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	5	**9**
11	Zeni J 2013	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	5	**13**

- 沒有檢測有無publication bias。

5. IF THE RESULTS OF THE REVIEW HAVE BEEN COMBINED, WAS IT REASONABLE TO DO SO?作者是否有把各個研究的結果合併起來？這樣的合

Table 4 Outcomes of studies using feedback following unil

#	Author year	Outcome measure	S
1	Christensen J 2018	Knee extensor angular impulse	3
		Impulse	7
		vGRF	1
2	Christiansen C 2015	Weight bearing ratio FTSST	0
		Weight bearing ratio walking	0
		Gait speed (m/s)	1
		FTSST (s)	9
		Lower limb joint moments	M
3	Fung V 2012	Outpatient rehab (days)	5
		2-min walk test (%[a])	4
		knee ROM flex/ext (%[a])	1
		ABCS (%[a])	4
		LEFS(%[a])	7
4	Hardt S 2018	Active/passive ROM (deg)	7
		Pain at rest/in motion (VAS)	2
		Gain in strength (kg)	3
5	Kuiken T 2004	Mean total activity rate	2
		Interactivity interval	6
6	Oh H 2017	Pain (VAS)	5
		Anterioposterior balance score	3
		Mediolateral balance score	3
7	Paxton R 2018	Physical activity (steps/ day)	I
		TUG (s)/6MWT (m)	s
		Gait speed (m/s)	
8	Shanb A 2014	WOMAC score	3
		Quadriceps isometric peak torque/BMI	2
9	Wang T 2014	CPM-elicited pain score (VAS)	B

The first question, "Does real-time biofeedback impact gait in patients who have undergone unilateral TKA?", can be answered with a clear "Yes, it does". In 9 of 11 stu
the conclusion is that biofeedback is improving reco
following TKA. Although there were several types of
feedback used in these 11 studies, most of the studies
sider feedback itself as helpful. Direct positive influenc
feedback was shown by eight studies [6, 12, 15, 17–19, 21, 22]. The big variety of outcome scores offer a diverse scope of what could be improved by feedback. Also the activity scores show a significant improvement [6, 17–19, 22] and
there was a direct improvement in gait (TUG, Gait speed, WOMAC score). On the other hand, the measurable parameters (knee angulation moment, vertical ground reaction force, weight bearing balance, range of motion, quad peak torque) are a kind of surrogate parameter for gait and also show a significant improvement by providing biofeedback [6, 12, 17, 22]. These measurable outcome parameters have a more objective view on outcomes and allow a reliable comparison between different types of feedback or devices. Some studies focused on the improvement in pain reported by the patients [11, 12, 17, 20] and showed good evidence

1. 文章間異質性太大作者沒有合併結果，但有個別分析統整其研究結果描述。

6. WHAT ARE THE OVERALL RESULTS OF THE REVIEW?
這篇回顧呈現了什麼結果？

Table 4 Outcomes of studies using feedback following unilateral TKA

#	Author year	Outcome measure	Study group mean (±SD)	Control group mean (±SD)	Improvement/difference	*p* value	Conclusion
1	Christensen J 2018	Knee extensor angular impulse	30%	1%	29%	<0.001	Knee-kinetic FB induces immediate improvements in gait characteristics
		Impulse	7%	2%	5%	0.075	
		vGRF	14%	4%	10%	0.001	
2	Christiansen C 2015	Weight bearing ratio FTSST	0.88 ± 0.11	0.91 ± 0.13	0.03 (−0.06, 0.12)	0.511	Weight-bearing FB did not improve functional weight-bearing symmetry
		Weight bearing ratio walking	0.98 ± 0.06	0.93 ± 0.06	0.03 (−0.05, 0.11)	0.402	
		Gait speed (m/s)	1.29 ± 0.25	1.24 ± 0.13	0.10 (−0.01, 0.20)	0.068	
		FTSST (s)	9.5 ± 2.4	9.6 ± 1.6	−1.3 (−2.3, −0.2)	0.021	
		Lower limb joint moments	Mult	Mult	nr	All > 0.05	
3	Fung V 2012	Outpatient rehab (days)	54.2 ± 27.2	53.0 ± 33.7	nr	0.892	Wii fit could be used as an adjunct to PT in rehab of balance and lower ext. function in TKA
		2-min walk test (%[a])	44.29	41.61	nr	0.855	
		knee ROM flex/ext (%[a])	17.18/0.55	17.51/1.15	nr	0.951/0.492	
		ABCS (%[a])	48.24	34.13	nr	0.523	
		LEFS(%[a])	73.36	41.51	nr	0.079	
4	Hardt S 2018	Active/passive ROM (deg)	78 ± 12/85 ± 11	67 ± 18/84 ± 11	nr	0.038/>0.05	Feedback controlled active muscle training improves outcome in TKA
		Pain at rest/in motion (VAS)	2 ± 1/4 ± 1	4 ± 2/5 ± 1	nr	0.01/0.002	
		Gain in strength (kg)	3.7 ± 5.6	0.2 ± 4.4	nr	0.031	
5	Kuiken T 2004	Mean total activity rate	22.05 ± 11.1	15.1 ± 10.9	nr	0.1	Audio feedback had more patient acceptance
		Interactivity interval	6.7 ± 5.7	3.6 ± 2.7	nr	0.07	
6	Oh H 2017	Pain (VAS)	5.33 ± 1.37 → 2.66 ± 1.07	5.58 ± 1.5 → 2.75 ± 0.96	2.66 ± 1.07/ 2.83 ± 0.93	<0.05	Feedback in TKA patients reduces pain and improves balance
		Anterioposterior balance score	3.44 ± 0.21 → 3.06 ± 0.16	3.48 ± 0.23 → 3.26 ± 0.21	−0.37 ± 0.18/ −0.21 ± 0.09	<0.05	
		Mediolateral balance score	3.31 ± 0.19 → 2.97 ± 0.23	3.35 ± 0.27 → 3.17 ± 0.24	−0.34 ± 0.15/ −0.17 ± 0.08	<0.05	
7	Paxton R 2018	Physical activity (steps/ day) TUG (s)/6MWT (m) Gait speed (m/s)	Improvements in both groups, further results of different subgroups are available in the original publication				Feedback on physical function is a feasible adjunct to conventional rehabilitation in TKA
8	Shanb A 2014	WOMAC score	39.66 ± 11.18 → 16 ± 4.73	45.66 ± 6.59 → 32.0 ± 4.73	nr	0	EMG FB may enhance functional activities of patients with TKA
		Quadriceps isometric peak torque/BMI	2.01 ± 0.23 →2.3 ± 0.32	1.92 ± 0.6 → 2.31 ± 0.66	nr	0.97	
9	Wang T 2014	CPM-elicited pain score (VAS)	Biofeedback reduced pain, further results are available in the original publication			<0.001	FB intervention reduces pain
10	Wilk M 2010	Knee flexion/extension (deg)	65.71/ −5.71	69.36/ −8.18	nr	nr	Feedback might be helpful in teaching activity and evaluate the treatment results
		Exercise time (s)	85	48	nr	nr	
		Time in the field (s)	59.71	27.8	nr	nr	
11	Zeni J 2013					Effect size	Feedback in TKA may lead to improved biomechanical symmetry
		KOS (%)	84 ± 10	86 ± 10	nr	0.2	
		Flexion ROM, deg	125 ± 9	119 ± 7	nr	0.78	
		TUG, s	8.1 ± 2.1	7.6 ± 1.8	nr	0.26	
		SCT, s	12.4 ± 4.6	12.1 ± 3.3	nr	0.08	
		6MWT, m	627 ± 141	564 ± 85	nr	0.54	
		Quadriceps index, %	85 ± 20	79 ± 20	nr	0.3	

FB feedback; *ABCS* Activity-specific Balance Confidence Scale; *LEFS* Lower Extremity Functional Scale

[a]Percentage change from study enrolment to discharge

7. HOW PRECISE ARE THE RESULTS?
結果精準嗎？

Table 4 Outcomes of studies using feedback following unilateral TKA

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		Weight bearing ratio walking	0.98 ± 0.06	0.93 ± 0.06	0.03 (− 0.05, 0.11)	0.402	
		Gait speed (m/s)	1.29 ± 0.25	1.24 ± 0.13	0.10 (− 0.01, 0.20)	0.068	
		FTSST (s)	9.5 ± 2.4	9.6 ± 1.6	− 1.3 (− 2.3, − 0.2)	0.021	
		Lower limb joint moments	Mult	Mult	nr	All > 0.05	
3	Fung V 2012	Outpatient rehab (days)	54.2 ± 27.2	53.0 ± 33.7	nr	0.892	Wii fit could be used as an adjunct to PT in rehab of balance and lower ext. function in TKA
		2-min walk test (%[a])	44.29	41.61	nr	0.855	
		knee ROM flex/ext (%[a])	17.18/0.55	17.51/1.15	nr	0.951/0.492	
		ABCS (%[a])	48.24	34.13	nr	0.523	
		LEFS(%[a])	73.36	41.51	nr	0.079	
4	Hardt S 2018	Active/passive ROM (deg)	78 ± 12/85 ± 11	67 ± 18/84 ± 11	nr	0.038/>0.05	Feedback controlled active muscle training improves outcome in TKA
		Pain at rest/in motion (VAS)	2 ± 1/4 ± 1	4 ± 2/5 ± 1	nr	0.01/0.002	
		Gain in strength (kg)	3.7 ± 5.6	0.2 ± 4.4	nr	0.031	
5	Kuiken T 2004	Mean total activity rate	22.05 ± 11.1	15.1 ± 10.9	nr	0.1	Audio feedback had more patient acceptance
		Interactivity interval	6.7 ± 5.7	3.6 ± 2.7	nr	0.07	
6	Oh H 2017	Pain (VAS)	5.33 ± 1.37 → 2.66 ± 1.07	5.58 ± 1.5 → 2.75 ± 0.96	2.66 ± 1.07/ 2.83 ± 0.93	< 0.05	Feedback in TKA patients reduces pain and improves balance
		Anterioposterior balance score	3.44 ± 0.21 → 3.06 ± 0.16	3.48 ± 0.23 → 3.26 ± 0.21	− 0.37 ± 0.18/ − 0.21 ± 0.09	< 0.05	
		Mediolateral balance score	3.31 ± 0.19 → 2.97 ± 0.23	3.35 ± 0.27 → 3.17 ± 0.24	− 0.34 ± 0.15/ − 0.17 ± 0.08	< 0.05	
7	Paxton R 2018	Physical activity (steps/ day)	Improvements in both groups, further results of different subgroups are available in the original publication				Feedback on physical function is a feasible adjunct to conventional rehabilitation in TKA
		TUG (s)/6MWT (m)					
		Gait speed (m/s)					
8	Shanb A 2014	WOMAC score	39.66 ± 11.18 → 16 ± 4.73	45.66 ± 6.59 → 32.0 ± 4.73	nr	0	EMG FB may enhance functional activities of patients with TKA
		Quadriceps isometric peak torque/BMI	2.01 ± 0.23 →2.3 ± 0.32	1.92 ± 0.6 → 2.31 ± 0.66	nr	0.97	
9	Wang T 2014	CPM-elicited pain score (VAS)	Biofeedback reduced pain, further results are available in the original publication			< 0.001	FB intervention reduces pain
10	Wilk M 2010	Knee flexion/extension (deg)	65.71/ − 5.71	69.36/ − 8.18	nr	nr	Feedback might be helpful in teaching activity and evaluate the treatment results
		Exercise time (s)	85	48	nr	nr	
		Time in the field (s)	59.71	27.8	nr	nr	

未MA，但止痛效果一致皆為有效。

8. CAN THE RESULTS BE APPLIED TO THE LOCAL POPULATION?
此研究是否可應用到你的病患？

Yes **No** **Can't tell**

Table 4 Outcomes of studies using feedback following unilateral TKA

#	Author year	Outcome measure	Study group mean (±SD)	Control group mean (±SD)	Improvement/difference	*p* value	Conclusion
1	Christensen J 2018	Knee extensor angular impulse	30%	1%	29%	< 0.001	Knee-kinetic FB induces immediate improvements in gait characteristics
		Impulse	7%	2%	5%	0.075	
		vGRF	14%	4%	10%	0.001	
2	Christiansen C 2015	Weight bearing ratio FTSST	0.88 ± 0.11	0.91 ± 0.13	0.03 (− 0.06, 0.12)	0.511	Weight-bearing FB did not improve functional weight-bearing symmetry
		Weight bearing ratio walking	0.98 ± 0.06	0.93 ± 0.06	0.03 (− 0.05, 0.11)	0.402	
		Gait speed (m/s)	1.29 ± 0.25	1.24 ± 0.13	0.10 (− 0.01, 0.20)	0.068	
		FTSST (s)	9.5 ± 2.4	9.6 ± 1.6	− 1.3 (− 2.3, − 0.2)	0.021	
		Lower limb joint moments	Mult	Mult	nr	All > 0.05	
3	Fung V 2012	Outpatient rehab (days)	54.2 ± 27.2	53.0 ± 33.7	nr	0.892	Wii fit could be used as an adjunct to PT in rehab of balance and lower extremity function in TKA
		2-min walk test (%[a])	44.29	41.61	nr	0.855	
		knee ROM flex/ext (%[a])	17.18/0.55	17.51/1.15	nr	0.951/0.492	
		ABCS (%[a])	48.24	34.13	nr	0.523	
		LEFS(%[a])	73.36	41.51	nr	0.079	
4	Hardt S 2018	Active/passive ROM (deg)	78 ± 12/85 ± 11	67 ± 18/84 ± 11	nr	0.038/>0.05	Feedback controlled active muscle training improves outcome in TKA
		Pain at rest/in motion (VAS)	2 ± 1/4 ± 1	4 ± 2/5 ± 1	nr	0.01/0.002	
		Gain in strength (kg)	3.7 ± 5.6	0.2 ± 4.4	nr	0.031	
5	Kuiken T 2004	Mean total activity rate	22.05 ± 11.1	15.1 ± 10.9	nr	0.1	Audio feedback had minor patient acceptance
		Interactivity interval	6.7 ± 5.7	3.6 ± 2.7	nr	0.07	
6	Oh H 2017	Pain (VAS)	5.33 ± 1.37 → 2.66 ± 1.07	5.58 ± 1.5 → 2.75 ± 0.96	2.66 ± 1.07/ 2.83 ± 0.93	< 0.05	Feedback in TKA patients reduces pain and improves balance
		Anterioposterior balance score	3.44 ± 0.21 → 3.06 ± 0.16	3.48 ± 0.23 → 3.26 ± 0.21	− 0.37 ± 0.18/ − 0.21 ± 0.09	< 0.05	
		Mediolateral balance score	3.31 ± 0.19 → 2.97 ± 0.23	3.35 ± 0.27 → 3.17 ± 0.24	− 0.34 ± 0.15/ − 0.17 ± 0.08	< 0.05	
7	Paxton R 2018	Physical activity (steps/ day)	Improvements in both groups, further results of different subgroups are available in the original publication				Feedback on physical function is a feasible adjunct to conventional rehabilitation in TKA
		TUG (s)/6MWT (m)					
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8	Shanb A 2014	WOMAC score	39.66 ± 11.18 → 16 ± 4.73	45.66 ± 6.59 → 32.0 ± 4.73	nr	0	EMG FB may enhance functional activities of patients with TKA
		Quadriceps isometric peak torque/BMI	2.01 ± 0.23 → 2.3 ± 0.32	1.92 ± 0.6 → 2.31 ± 0.66	nr	0.97	
9	Wang T 2014	CPM-elicited pain score (VAS)	Biofeedback reduced pain, further results are available in the original publication			< 0.001	FB intervention reduces pain

文獻研究分析是以生物回饋使用在TKA患者中，在關節角度、2分鐘步行測試、疼痛、運動時間等。

本篇系統性研究歸納了7篇RCT文獻、3篇Cohort 1篇cross sectional。

研究結果顯示整體介入措施成效良好，且不管是何種面向的結果，大抵都是與無生物回饋相比較皆有不同程度的改善。

8. CAN THE RESULTS BE APPLIED TO THE LOCAL POPULATION?
此研究是否可應用到你的病患？

Yes **No** **Can't tell**

- 我們的病患與研究是否相仿？
  - ●性別 ○相同疾病 ○種族 ●年齡
  - ●疾病特徵（症狀/共病症）
- 這項治療方式在本地可行嗎？
  - ○醫療政策 ● 技術性 ○風土民情
- 是否符合病患主要訴求？
  - ●病患考量點：這種治療是否有效
    是否有副作用

9. WERE ALL IMPORTANT OUTCOMES CONSIDERED?
是否所有重要的臨床結果都被考量到？

Yes **No** **Can't tell**

The studies in this review were insufficient to determine "What type of real-time biofeedback (visual, audio, haptic) appears to be the most effective at improving the gait pattern in patients that underwent unilateral TKA?" Most of the studies use a visual feedback without giving a rational why they do this. Some studies match visual and audio feedback and Kuiken et al. [15] even mention that audio is more helpful for patients as it is hard for some of the patients without reading glasses to see the visual feedback. The main goal in providing feedback is doing it in an easy to understand way for the patient. How much help and instructions were given to make the patient follow the feedback and understand what they were supposed to do for improving their gait varied between the studies (Table 3). The use of indirect feedback allows the patient to play a video game or similar tasks on the instrumented feedback device. This playful approach might be helpful to keep the compliance high compared to direct feedback where the outcome parameter itself goes directly from the device to the patient. Overall in the included studies, no difference was demonstrated between indirect and direct feedback.

A limitation of this review is the small number of studies that were eligible for inclusion. This is due to the relatively new approach of providing feedback in TKA patients (only one study is older than 10 years). The heterogeneity between the studies, especially the variability of interventions and outcomes, did not allow us to calculate a meta-analysis or an overall intervention effect. A major limitation of existing studies is the short follow-up. Only three studies [6, 7, 22] included a 6-month follow-up. Three other studies [12, 15, 20] limited follow-up to 1 week, a considerably short-term follow-up interval. The methodology scores differed from 9 to 27 points showing the wide variety of the studies' quality. Most of the interventions were conducted in a laboratory like situation (standing on the balance board, leg press, treadmill, during CPM) and therefore are not directly transferable to the real-world setting. Wearable insole devices offer a valid measurement of ground reaction forces for gait analysis in clinical settings [5, 9, 14] and even in extreme conditions, like climbing, this analysis is available [2]. Additional studies using this technology may prove beneficial.

Based upon the reviewed studies, some potential recommendations include: biofeedback may be a viable adjunct to the post-operative rehabilitation protocols following TKA; if used, biofeedback should be provided at least twice a week; the length of feedback in each setting should range between 15 and 45 min; and the intervention for feedback should be as close to a real life setting as possible, not in a gait laboratory.

文獻主要探討疼痛改善，亦對ROM及活動功能改善有討論，整體結果皆正向。

10. ARE THE BENEFITS WORTH THE HARMS AND COSTS?
這些好處隨之而來的傷害和花費是否值得？

Yes | No | Can't tell

Conclusion

In summary, training with biofeedback after TKA is a viable way to improve gait symmetry, reduce pain and increase activity level. There are two main findings where the studies included in this review differ from each other: type of device and type of feedback (intensity, duration, mode). Due to the rather large variety of type of feedback and outcomes, it is unfeasible to recommend one preferred method, but some advantages were recognizable. It is also not possible to determine the most effective type of devices, as most studies reported significant improvements with the various devices. The current evidence shows a strong potential for biofeedback as a method of training after TKA. However, further studies with long-term follow-up in real-life situations with wearable biofeedback devices are needed.

未表明需額外花費，但亦未有額外副作用或不適，仍建議使用

證據等級-OCEBM, LEVEL OF EVIDENCE

Question	Step 1 (Level 1*)	Step 2 (Level 2*)	Step 3 (Level 3*)	Step 4 (Level 4*)	Step 5 (Level 5)
How common is the problem?	Local and current random sample surveys (or censuses)	Systematic review of surveys that allow matching to local circumstances**	Local non-random sample**	Case-series**	n/a
Is this diagnostic or monitoring test accurate? (Diagnosis)	Systematic review of cross sectional studies with consistently applied reference standard and blinding	Individual cross sectional studies with consistently applied reference standard and blinding	Non-consecutive studies, or studies without consistently applied reference standards**	Case-control studies, or "poor or non-independent reference standard**	Mechanism-based reasoning
What will happen if we do not add a therapy? (Prognosis)	Systematic review of inception cohort studies	Inception cohort studies	Cohort study or control arm of randomized trial*	Case-series or case-control studies, or poor quality prognostic cohort study**	n/a
Does this intervention help? (Treatment Benefits)	Systematic review of randomized trials or *n*-of-1 trials	Randomized trial or observational study with dramatic effect	Non-randomized controlled cohort/follow-up study**	Case-series, case-control studies, or historically controlled studies**	Mechanism-based reasoning
What are the COMMON harms? (Treatment Harms)	Systematic review of randomized trials, systematic review of nested case-control studies, *n*-of-1 trial with the patient you are raising the question about, or observational study with dramatic effect	Individual randomized trial or (exceptionally) observational study with dramatic effect	Non-randomized controlled cohort/follow-up study (post-marketing surveillance) provided there are sufficient numbers to rule out a common harm. (For long-term harms the duration of follow-up must be sufficient.)**	Case-series, case-control, or historically controlled studies**	Mechanism-based reasoning
What are the RARE harms? (Treatment Harms)	Systematic review of randomized trials or *n*-of-1 trial	Randomized trial or (exceptionally) observational study with dramatic effect			
Is this (early detection) test worthwhile? (Screening)	Systematic review of randomized trials	Randomized trial	Non -randomized controlled cohort/follow-up study**	Case-series, case-control, or historically controlled studies**	Mechanism-based reasoning

篩選結果

The Journal of Physical Therapy Science

Original Article

The effects of proprioception exercise with and without visual feedback on the pain and balance in patients after total knee arthroplasty

Hyung-Taek Oh, PT, MS[1)], Gak Hwangbo, PT, PhD[1)*]

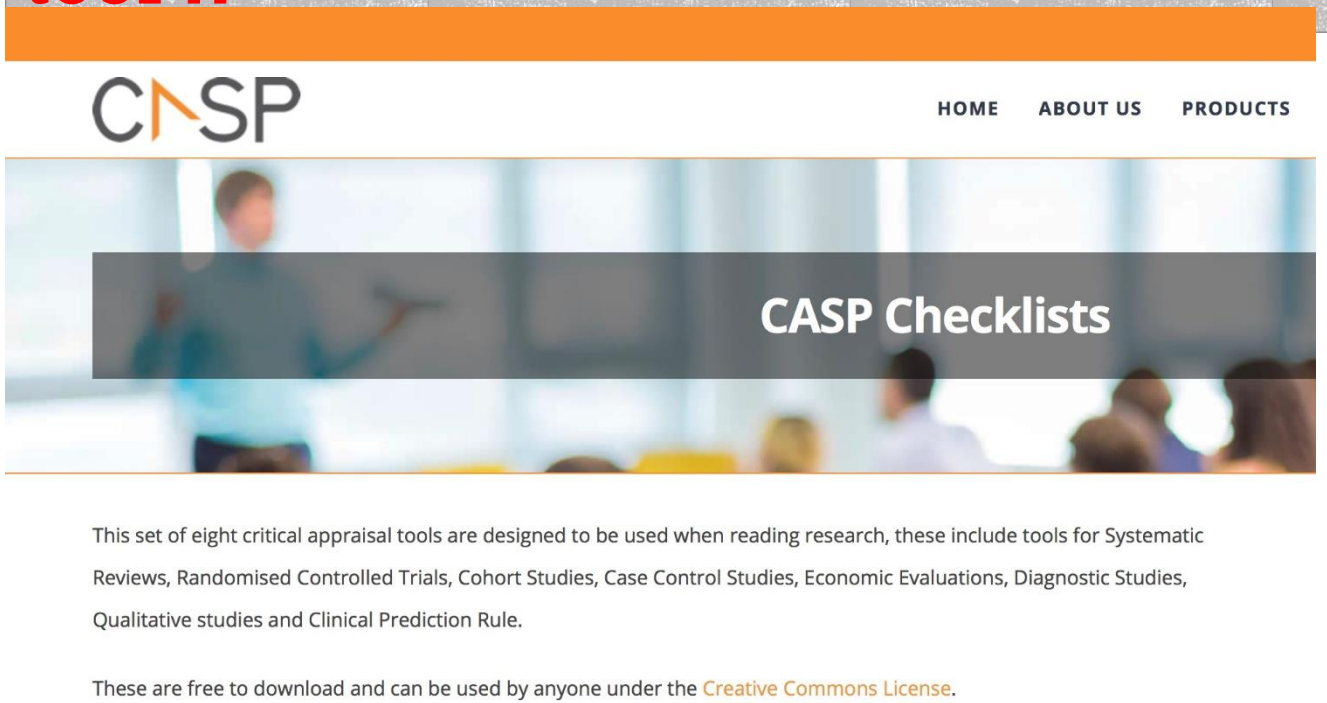
[1)] *Department of Physical Therapy, College of Rehabilitation Sciences, Daegu University: Jillyang, Gyeongsan, Gyeongbuk 712-714, Republic of Korea*

Abstract. [Purpose] The aim of this study was to determine the effects of proprioception exercise to decrease pain and increase the ability to balance by implementing visual feedback during early rehabilitation after total knee arthroplasty. [Subjects and Methods] In this study, 24 patients who receive a total knee arthroplasty were randomly and equally assigned to a visual feedback training group (VFT group) and a visual disuse group (Control group). They performed visual feedback training using the My Fitness Trainer (MFT, Austria) for 20 minutes, three times per week for eight weeks. The patients' balance ability and pain was measured before and after the exercises. Pain was measured by the visual analogue scale (VAS). To assess balance ability, the anteroposterior and mediolateral

- ✓最符合臨床問題
- ✓發表年份較新
- ✓最佳的研究設計
- ✓有全文可供評讀

正確使用文獻評讀指南工具

我們的文獻評讀工具是 NHS CASP RCT critical appraisal tool !!



選用評讀工具理由

- ✓簡單扼要
- ✓國際廣泛運用
- ✓可適用於多種研究設計

1. DID THE TRIAL ADDRESS A CLEARLY FOCUSED QUESTION?
此研究是否問了一個清楚明確的問題?

Yes **No** **Can't tell**

The Journal of Physical Therapy Science

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Ⓟ Total knee arthroplasty
Ⓘ Visual feedback
Ⓒ
Ⓞ Pain

2. WAS THE ASSIGNMENT OF PATIENTS TO TREATMENTS RANDOMISED?
此研究是否適當的隨機分派病患？

Yes | No | Can't tell

文章節錄

SUBJECTS AND METHODS

Among the patients who received rehabilitation exercise after TKA, 24 patients who were aware of the intent of this study and agreed to participate were chosen as subjects. Written informed consent according to the ethical standards of the Declaration of Helsinki was provided by all subjects prior to participation, and all agree to participate in this study. The subjects, who were capable of standing and weight loading on the affected side after TKA, were randomly divided into an experimental group (n=12) and a control group (n=12). The two groups received training three times a week for a total of eight weeks.

The My Fitness Trainer (MFT, Austria) balance board, which is manufactured in Austria, was used for the experimental group and the control group. The equipment is comprised of a circular foothold that moves freely in the anteroposterior and mediolateral directions on stable ground, a monitor that displays the movement of the foothold, and a computer that processes the movements. The patients moved their trunks, which were marked with a cross at the center of the target displayed on the

3.WERE ALL OF THE PATIENTS WHO ENTERED THE TRIAL PROPERLY ACCOUNTED FOR AT ITS CONCLUSION?是否所有的病患都有納入結果中去分析？

Yes | No | Can't tell

Table 1. The general characteristics of the subjects

	VFT group (n=12) (Mean ± SD)	Control group (n=12) (Mean ± SD)
Gender (male/female)	5/7	4/8
Age (yrs)	69.5 ± 2.9	70.3 ± 2.5
Height (cm)	161.6 ± 6.7	159.1 ± 10.2
Weight (kg)	62.7 ± 6.8	59.1 ± 7.5

VFT group: visual feedback training group; Control group: visual feedback disuse group.

- 沒有提及是否提早結束
- 沒有病人流失率
- 使用 Intention-To-Treat (ITT) analysis

Table 2. Comparison of within and between two groups

	VFT group			Control group		
	pre-test	post-test	change	pre-test	post-test	change
VAS	5.33 ± 1.37	2.66 ± 1.07*	2.66 ± 1.07	5.58 ± 1.50	2.75 ± 0.96*	2.83 ± 0.93
A-P balance (scores)	3.44 ± 0.21	3.06 ± 0.16*	−0.37 ± 0.18†	3.48 ± 0.23	3.26 ± 0.21*	−0.21 ± 0.09
M-L balance (scores)	3.31 ± 0.19	2.97 ± 0.23*	−0.34 ± 0.15†	3.35 ± 0.27	3.17 ± 0.24*	−0.17 ± 0.08

(Mean ± SD) *$p<0.05$, †Significant difference between groups ($p<0.05$).
VFT group: visual feedback training group; Control group: visual feedback disuse group;
A-P balance: anteroposterior balance; M-L balance: mediolateral balance, score: 0–5 point.

4. WERE PATIENTS, HEALTH WORKERS AND STUDY PERSONNEL 'BLIND' TO TREATMENT?病患、(給藥、測量結果的)醫療照護者、分析數據人員是否都是「盲性的」？

Yes　No　Can't tell

SUBJECTS AND METHODS

Among the patients who received rehabilitation exercise after TKA, 24 patients who were aware of the intent of this study and agreed to participate were chosen as subjects. Written informed consent according to the ethical standards of the Declaration of Helsinki was provided by all subjects prior to participation, and all agree to participate in this study. The subjects, who were capable of standing and weight loading on the affected side after TKA, were randomly divided into an experimental group (n=12) and a control group (n=12). The two groups received training three times a week for a total of eight weeks.

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the movements. The patients moved their trunks, which were marked with a cross at the center of the targ
monitor, while in a standing position with slightly bent knees, maintaining the center position as long as possible. The members of the experimental group, known as the visual feedback training (VFT) group, received training on the MFT while using visual feedback by watching the monitor. To ensure identical conditions, the control group trained on the same MFT used by the VFT group but did not receive any visual feedback. Both the VFT group and the control group exercised for 20 minutes.

Pain was measured by the visual analogue scale (VAS) twice during the eight-week research period for the members of the VFT group and the control group—before the study began and at the end of the eight weeks. The anteroposterior and mediolateral directions on unstable ground was measured for 30 seconds by using the MFT measurement system. The time it took an individual to balance his/her weight was marked on a target divided into five sections, from the highest score of 0 to the lowest score of 5; the results were calculated as a ratio of the delay time to the total measured time, which was given as a percentage. In both the VFT group and the control group, balancing ability was measured before and after the experiment. For the latter measurement, balance was determined after a 30-minute rest following the end of the exercise to minimize fatigue.

This study used SPSS 18.0 for Windows to conduct the data analysis. A paired t-test was used to test the within-group level of pain and balancing ability before and after the experiment. A covariance analysis (ANCOVA) on the post-measured value was conducted by setting the pre-value as the covariance to test the significance of the difference between groups. The significance level α was set at 0.05 for all statistical analyses.

RESULTS

■沒有提及盲化

Appraisal
評讀

5. IF THE RESULTS OF THE REVIEW HAVE BEEN COMBINED, WAS IT REASONABLE TO DO SO?

隨機分派後的兩組病患是否具有可比性？

Yes **No** **Can't tell**

■人口學變項無顯著差異

Table 1. The general characteristics of the subjects

	VFT group (n=12) (Mean ± SD)	Control group (n=12) (Mean ± SD)
Gender (male/female)	5/7	4/8
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Weight (kg)	62.7 ± 6.8	59.1 ± 7.5

VFT group: visual feedback training group; Control group: visual feedback disuse group.

Appraisal 評讀

6. ASIDE FROM THE EXPERIMENTAL INTERVENTION, WERE THE GROUPS TREATED EQUALLY?除了研究介入 (INTERVENTION)的差別，兩組間其他的治療是否相等？

Yes | No | Can't tell

- 僅差別在有無使用視覺回饋裝置

he movements. The patients moved their trunks, which were marked with a cross at the center of the target displayed c
nonitor, while in a standing position with slightly bent knees, maintaining the center position as long as possible. The r
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7. HOW LARGE WAS THE TREATMENT EFFECT?
介入的治療效果有多大？

文章節錄

	VFT group			Control group		
	pre-test	post-test	change	pre-test	post-test	change
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A-P balance (scores)	3.44 ± 0.21	3.06 ± 0.16*	−0.37 ± 0.18†	3.48 ± 0.23	3.26 ± 0.21*	−0.21 ± 0.09
M-L balance (scores)	3.31 ± 0.19	2.97 ± 0.23*	−0.34 ± 0.15†	3.35 ± 0.27	3.17 ± 0.24*	−0.17 ± 0.08

(Mean ± SD) *$p<0.05$, †Significant difference between groups ($p<0.05$).
VFT group: visual feedback training group; Control group: visual feedback disuse group;
A-P balance: anteroposterior balance; M-L balance: mediolateral balance, score: 0–5 point.

8. HOW PRECISE WAS THE ESTIMATE OF THE TREATMENT EFFECT?
治療效果的估計值有多精確？

文章節錄

VFT組組內 運動後疼痛分數為2.66±1.07，沒有陳述其標準差。

	VFT group			Control group		
	pre-test	post-test	change	pre-test	post-test	change
VAS	5.33 ± 1.37	2.66 ± 1.07*	2.66 ± 1.07	5.58 ± 1.50	2.75 ± 0.96*	2.83 ± 0.93
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(Mean ± SD) *p<0.05, †Significant difference between groups (p<0.05).

VFT group: visual feedback training group; Control group: visual feedback disuse group.

9. CAN THE RESULTS BE APPLIED TO THE LOCAL POPULATION, OR IN YOUR CONTEXT?

此研究是否可應用到你的病患？

文章節錄

文獻研究分析是以TKA 手術術後病人。且平均年齡層介於66-72歲，女性(62.5%)。符合本題目的背景，故可應用到病患身上。

Table 1. The general characteristics of the subjects

	VFT group (n=12) (Mean ± SD)	Control group (n=12) (Mean ± SD)
Gender (male/female)	5/7	4/8
Age (yrs)	69.5 ± 2.9	70.3 ± 2.5
Height (cm)	161.6 ± 6.7	159.1 ± 10.2
Weight (kg)	62.7 ± 6.8	59.1 ± 7.5

VFT group: visual feedback training group; Control group: visual feedback disuse group.

9. CAN THE RESULTS BE APPLIED TO THE LOCAL POPULATION, OR IN YOUR CONTEXT?

此研究是否可應用到你的病患？

Yes　No　Can't tell

- 我們的病患與研究是否相仿？
  - ●性別 ●相同疾病 ○種族 ●年齡
  - ●疾病特徵（症狀/共病症）
- 這項治療方式在本地可行嗎？
  - ●醫療政策 ● 技術性 ●風土名情
- 是否符合病患主要訴求？
  - ●病患考量點：

10. WERE ALL CLINICALLY IMPORTANT OUTCOMES CONSIDERED?
是否所有重要的臨床結果都被考量到？

Yes **No** **Can't tell**

文章節錄

文獻研究以平衡能力作為另依評估之參數，術後病人有好的本體感覺才能有近端肢體穩定度，可避免跌倒異常事件，以及維持增加活動力。

	VFT group			Control group		
	pre-test	post-test	change	pre-test	post-test	change
VAS	5.33 ± 1.37	2.66 ± 1.07*	2.66 ± 1.07	5.58 ± 1.50	2.75 ± 0.96*	2.83 ± 0.93
A-P balance (scores)	3.44 ± 0.21	3.06 ± 0.16*	−0.37 ± 0.18†	3.48 ± 0.23	3.26 ± 0.21*	−0.21 ± 0.09
M-L balance (scores)	3.31 ± 0.19	2.97 ± 0.23*	−0.34 ± 0.15†	3.35 ± 0.27	3.17 ± 0.24*	−0.17 ± 0.08

(Mean ± SD) *$p<0.05$, †Significant difference between groups ($p<0.05$).

VFT group: visual feedback training group; Control group: visual feedback disuse group

11. ARE THE BENEFITS WORTH THE HARMS AND COSTS?
這些好處隨之而來的傷害和花費是否值得？

Yes　　No　　Can't tell

選擇	優點	缺點	花費(成本)
生物回饋	投入感 強調視覺以及前庭知覺， 綜 合體感的刺激。	無	設備購置 30,000 依次數遞減
無生物回饋	無	無	便宜

評讀結果

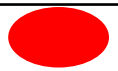
		問題	結果
有效性	1	Did the trial address a clearly focused issue?	●YES ○NO ○Can't tell
	2	Was the assignment of patients to treatments randomised?	○YES ○NO ●Can't tell
	3	Were all of the patients who entered the trial properly accounted for at its conclusion?	●YES ○NO ○Can't tell
	4	Were patients, health workers and study personnel 'blind' to treatment?	○YES ●NO ○Can't tell
	5	Were the groups similar at the start of the trial	●YES ○NO ○Can't tell
	6	Aside from the experimental intervention, were the groups treated equally?	●YES ○NO ○Can't tell
重要性	7	How large was the treatment effect?	
	8	How precise was the estimate of the treatment effect?	
應用性	9	Can the results be applied to the local population, or in your context?	●YES ○NO ○Can't tell
	10	Were all clinically important outcomes considered?	●YES ○NO ○Can't tell
	11	Are the benefits worth the harms and costs?	○YES ○NO ●Can't tell

證據等級-OCEBM, LEVEL OF EVIDENCE

Question	Step 1 (Level 1*)	Step 2 (Level 2*)	Step 3 (Level 3*)	Step 4 (Level 4*)	Step 5 (Level 5)
How common is the problem?	Local and current random sample surveys (or censuses)	Systematic review of surveys that allow matching to local circumstances**	Local non-random sample**	Case-series**	n/a
Is this diagnostic or monitoring test accurate? (Diagnosis)	Systematic review of cross sectional studies with consistently applied reference standard and blinding	Individual cross sectional studies with consistently applied reference standard and blinding	Non-consecutive studies, or studies without consistently applied reference standards**	Case-control studies, or "poor or non-independent reference standard**	Mechanism-based reasoning
What will happen if we do not add a therapy? (Prognosis)	Systematic review of inception cohort studies	Inception cohort studies	Cohort study or control arm of randomized trial*	Case-series or case-control studies, or poor quality prognostic cohort study**	n/a
Does this intervention help? (Treatment Benefits)	Systematic review of randomized trials or *n*-of-1 trials	Randomized trial or observational study with dramatic effect	Non-randomized controlled cohort/follow-up study**	Case-series, case-control studies, or historically controlled studies**	Mechanism-based reasoning
What are the COMMON harms? (Treatment Harms)	Systematic review of randomized trials, systematic review of nested case-control studies, *n*-of-1 trial with the patient you are raising the question about, or observational study with dramatic effect	Individual randomized trial or (exceptionally) observational study with dramatic effect	Non-randomized controlled cohort/follow-up study (post-marketing surveillance) provided there are sufficient numbers to rule out a common harm. (For long-term harms the duration of follow-up must be sufficient.)**	Case-series, case-control, or historically controlled studies**	Mechanism-based reasoning
What are the RARE harms? (Treatment Harms)	Systematic review of randomized trials or *n*-of-1 trial	Randomized trial or (exceptionally) observational study with dramatic effect			
Is this (early detection) test worthwhile? (Screening)	Systematic review of randomized trials	Randomized trial	Non -randomized controlled cohort/follow-up study**	Case-series, case-control, or historically controlled studies**	Mechanism-based reasoning

評定臨床證據-GRADEPRO ONLINE

臨床問題：**biofeedback**是否可改善TKA病人術後疼痛情形？

效果		第一篇文章	第二篇文章
		over all Pain score	VAS
		P < 0.01	2.66 ± 1.07
研究設計		SR	RCT
降階	1. 存在誤差風險		
	2. 結果不一致		
	3. 證據不具直接性		
	4. 結果不精準		
	5. 存在發表誤差		
升階	1. 效果顯著		
	2. 降低干擾因素		
	3. 具劑量-反應效果		

證據等級	⊕⊕⊕ 中度建議

GRADEpro GDT

臨床應用

	評讀文獻	臨床情境
P	>18歲成年人 男、女受試者比例近1:1	72歲、女性、台灣人
I	生物回饋	生物回饋
C	無	無
O	疼痛、活動功能、生活品質	疼痛

1. 病患與文獻研究是否相似？ 年齡☑ 性別☑ 疾病☑ 家屬接受☑ 家屬考量☑	是
2. 這項治療在台灣是否可行？	可

成本效益

治療	優點	價格
止痛藥物	效果較快	數十元到數百元
CPM	操作簡單，教導後可自行施行	-
生物回饋治療	**不僅有緩解疼痛效果，亦可增進活動功能**	**數千到數萬元**
電針	可針對特定部位使用，效果直接	約7-10萬

利益與風險考量？

治療	缺點	額外風險/付出
止痛藥物	病人擔心傷身	藥物成癮、胃部損傷
CPM	疼痛情況下不便使用	效果不彰
生物回饋治療	**花費較高，且須專業人員引導**	**需病人亦主動投入**
電針	效果較不顯著	傷口感染風險

醫病共享決策 SHARE DECISION MAKING (SDM)

醫病共享決策 SHARE DECISION MAKING (SDM)

病患選擇治療方式會在意的因素有什麼？以及在意的程度 ？

考量因素	不重要	普通	重要	非常重要
經濟		V		
較好生活品質				V
照護的方便性			V	
病人的舒適性				V
病人可存活時間	V			
治療				V

共享決策

實證醫學	家屬考量
文獻等級：level I 證據等級：GRADE（moderate） 臨床建議：中度建議TKA術後病人可用biofeedback搭配藥物來緩解術後關節疼痛情形。	TKA術後使用biofeedback治療的止痛效果
利弊平衡	**費用資源**
➢ TKA術後病人使用biofeedback可減少疼痛情形，亦可增進ROM及活動功能改善 ➢ 研究中無任何不適反應發表	研究中的生物回饋方式，以視覺反饋方式占大多數，其不需額外花費，但缺點是需有專業人員引導，但對於術後住院病人，問題即不復存在

實際應用

盧太太您好，透過詳細的實證研究搜尋後，顯示止痛藥物搭配生物回饋治療(Biofeedback)的確對於您術後關節疼痛的症狀會有改善，雖不能因此完全避免止痛藥物使用，但或許可以因此減少藥物使用量，住院期間，會有專業人員來協助、引導您這樣的治療方式，希望對您有所幫助。


THANK
YOU