Orthopedic Resident Education in Fracture Prevention:

A key role for the FLS coordinator

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DISCLOSURES

Unconditional research funding for investigator-designed projects - Amgen Canada Inc

Advisory Board consultant - Amgen Canada Inc

Committees of Osteoporosis Canada

Inaugural holder of The Brookfield Chair in Fracture Prevention

Resident Education in the Orthopedic Curriculum

- **Engaging the residents in daily work flow**
- **Learning fracture prevention in “the daily grind”**

How the FLS Coordinator can be a *powerhouse* for resident education

…AS SEEN DURING THE RESIDENT'S FIRST WEEK ON SERVICE

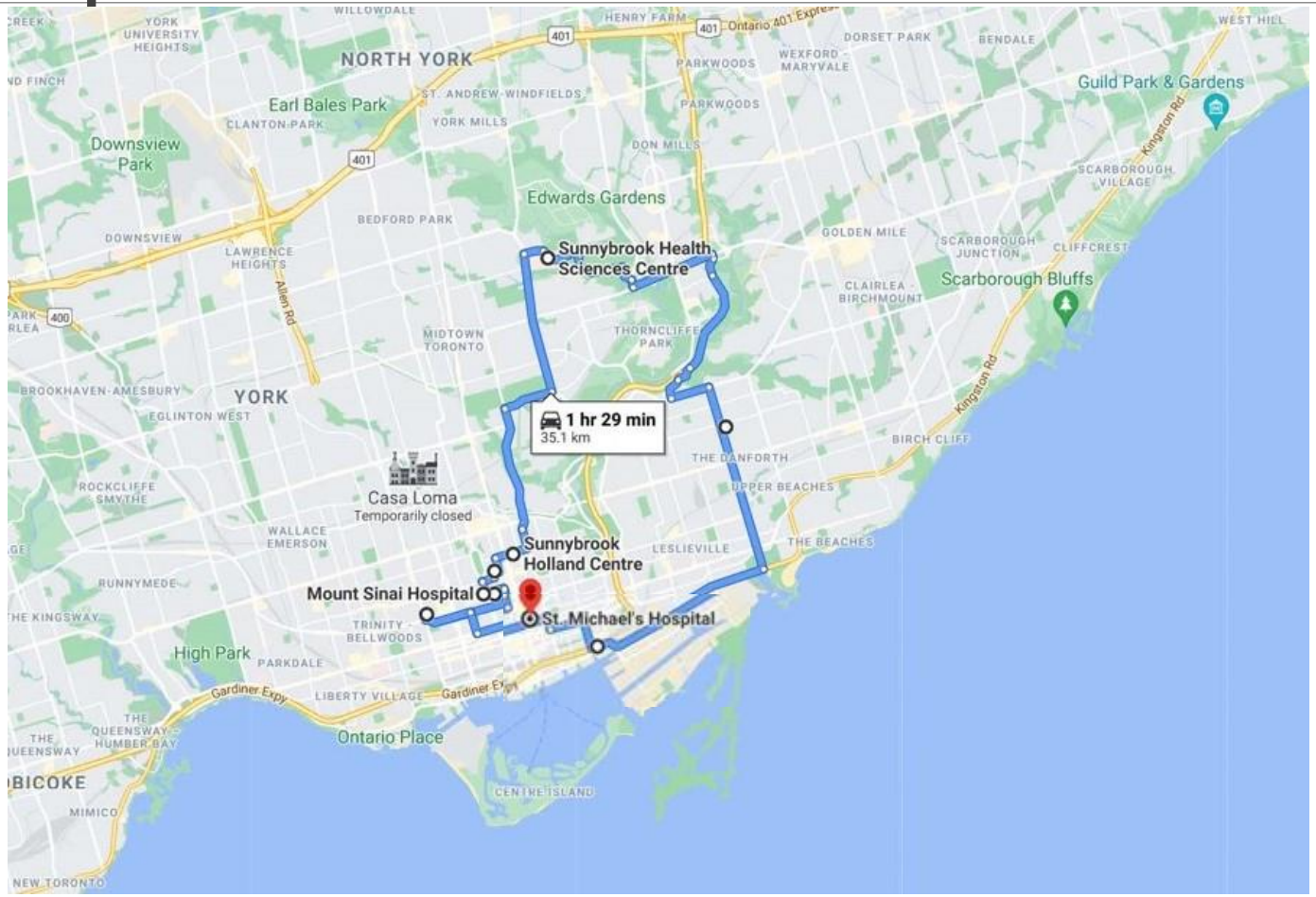
Goals and Objectives

- Opportunities to include fracture prevention into the formal orthopedic curriculum

***How to incorporate real world bone health experience into daily resident clinical workflow**

***An advanced role for the coordinator/FLS Nurse in facilitating resident learning in bone health**

Follow the Resident from Day 1 of their assignment to the St. Michael's Hospital



Resident Rotation

SickKids
THE HOSPITAL FOR SICK CHILDREN

Toronto Western Hospital
University Health Network

MICHAEL GARRON HOSPITAL
TORONTO EAST HEALTH NETWORK

WCHH
WOMEN'S COLLEGE HOSPITAL
Health care for women | REVOLUTIONIZED

MOUNT SINAI HOSPITAL
Bright Minds. Big Hearts. The Best Medicine.

Sunnybrook
HEALTH SCIENCES CENTRE

St. Michael's

Inspired Care.
Inspiring Science.

Roles of the Coordinator

Victoria Elliot-Gibson
Fracture Prevention Coordinator

Coordinates Inpatient Pathway

Coordinates Outpatient Pathway

Database, Analysis, QI
Publications and Presentations
Consultant to Osteoporosis Canada
Teaching/training residents

Role: Resident Education

- **Accomplished by drawing the residents into her daily tasks**
- **“boots on the ground”**
- **They learn bone health by doing it under the guidance of the FLS coordinator**

Various Titles of this Role

- **Fracture Liaison Nurse**
- **FLS Nurse**
- **FLS Coordinator**
- **Fracture Prevention Coordinator**
- **Bone Health Coordinator**
- **Victoria!**

Day 1 – Orientation: Focus on resident role in fracture prevention

- **Introduction: Victoria sends an email on the Post Fracture Program to all residents on Day 1**

- **She meets with residents within first days to complete the orientation**

The residents will encounter Victoria every day of their 3 month rotation

Merges her work flow with theirs

Sends prompts and guidance to pursue the many steps required in effective fracture prevention

“It takes a village” to prevent a fracture….

Fracture Prevention Coordinator

Surgeons, Residents, Fellows
Inpatient Orthopedic Team
Outpatient Fracture Clinic Team
Outpatient Metabolic Bone Specialists
Nuclear Medicine
PCP

Day 2 – On Call Handover List

-TRAUMA ROOM CASES
-CONSULTATIONS IN ER
-ADMISSIONS

The handover list

….a tool for resident bone health education

SUMMARY

ORs Completed: 2
ORs Booked: 2
ORs Pending Booking: 0
ORs Cancelled: 1
==========
Traumas: 3
Admissions: 2
Consults: 4
Ward Issues: 0

Mon 4/26/2021 5:45 AM

Sam Keshen

SMH Handover Apr 25/26

To Caroline Cristofaro; Yue Ting Kero Yuen; Brent Bates; Tyler Hauer; Maegan Shields; Jimmy Tat; Joseph Di Michele; Aaron Nauth; Timothy Daniels; Daniel Whelan; Jeremy Hall; Sarah Ward; Mansur Halai; Henry Ahn; Amir Khoshbin; Amit Atrey; Shahin Kayum; Milena Vicente; Gunesh Ramdehalchand; Ortho Trauma; Mina Waheed Wahba Morcos; Maurice Tom-Pack; Spencer Montgomery; Sarfraz Malleck; Kelechi Eseonu; Daniel Aron Cohen; Victoria Elliot-Gibson; Sarah Wood; Joelle Cross; Ksenia Mikhalevskaya; James Wu; Helen Owh; James Waddell; Beata Piotrowska; Andrea Harrison; Cheann Quilloy; Paul Owh; Khalid Almaazmi; Adrian Falko Dahm (Health Care Practitioners); Jan Van Meirhaeghe; Ian Whatley; Kunal Bhanot; Megan Julia Harriett Richards (Health Care Practitioners); Christine Kuan; Yu-Wen Huang; Misgana Workneh; Rafi Husain; Denise Hada; Kajeandra Ravichandiran

TRAUMA ROOM CASES

XXXXXXXX - 85F, Ground level fall (06:05)
Primary: Airway stable, HD stable, FAST negative. Pelvis stable. GCS 15.
HPI: Patient had a ground level fall last night at ~21:00. Unable to ambulate afterwards. Denies head injury. Brought to XXXXX then transferred to SMH as a trauma with reported multiple orthopaedic injuries (reported as L clavicle, L humerus, L hip, L trimal ankle) and no CT scanner available. History of bilateral THA + L TKA, with revision of L THA to long diaphyseal fitting stem and distal femoral locking plate + cable construct.
O/E: Patient moving R side limbs spontaneously in trauma bay, able to move toes and fingers of L extremities. L clavicle without tenderness. L upper arm in sling with moderate swelling, bruising and TTP, no open wounds. L wrist ROM intact. L hip without pain on log roll, able to flex L hip/knee to ~30 degrees with mild pain. L ankle in backslab splint, removed in TB, varus deformity to L ankle/distal tibia, no open wounds. R side without long bone deformity, no abrasions/lacerations, no joint swelling, no pain/crepitus on palpation/ranging of extremities. Motor function intact, sensation intact in bilateral upper and lower extremities. Palpable pulses x4. Tenderness to L spine, no steps/bogginess on palpation of spine, perianal sensation intact, DRE with intact tone and no blood.
Ortho: L segmental spiral humerus fracture, L distal tibia fracture
Non-ortho: Nil (final pan scan reports pending)
Spine: T spine compression fractures
A/P: Patient in emerg. L arm and L tibia reduced in TB, coaptation splint applied to L arm, long leg splint to L leg. Awaiting final CT scans including pelvis, L femur, L knee, L ankle. To review with Dr. XXXX on completion of imaging. Secondary survey pending.

Geriatrics assesses ALL trauma patients aged ≥ 65 years, including bone health

CONSULTS:

XXXXXXX – 89F, left proximal humerus fracture (1730)

HPI: Fall at home, was seen in ER that day and placed in sling by ER and discharged home. Has since returned due to pain and delirium. Now admitted under GIM. She is stable, compliant with her sling on the left arm and pain is managed with oral medications.

PMHx: COPD, CLL, previous LT THA, NSTEMI

Meds: Plavix, asa, Lipitor

SHx: 70 pack year smoking history, lives with daughter

Imaging: xrays show 2 part fracture of the proximal humerus with fracture line through surgical neck.

O/E: bruising on face and left arm, closed injury, tender with palpation of proximal humerus, axillary nerve sensation intact, palpable radial pulse and warm and perfused hand, motor intact, able to flex/extend interphalangeal joints of all digits, abduct and adduct fingers, flex and extend wrist.

A/P: Admitted to GIM. Continue collar and cuff sling, NWB left shoulder, repeat xrays have been ordered and are pending, follow-up in fracture clinic in 2 weeks with new x-rays and can likely progress to pendulum exercises at that time.

XXXXXXX - 61F, R distal radius fracture; (1830)

HPI: ED consult for colles fx unable to reduce. Suffered a fall after tripped on tile at work. No LOC. No prodrome. Isolated injury. Closed injury.

PMHx: Excision of ganglion and tumor + fusion of right first MTP joint with femoral head bone graft (Dr. XXXX, 2017), Raynaud's phenomenon, primary biliary cirrhosis, Adenomyosis

Meds: Methotrexate, Leflunomide, Folic acid

All: iodine contrast (anaphyaltic)

SHx: RHD. Works at XXXX at an office job. Ex smoker (30y ago), no ETOH, no rec drugs. Lives at with home with family.

O/E: VSS. R wrist deformity, closed. Painful. DNVI.

Imaging: R DR fracture (extra-articular, dorsal angulated, comminuted), adequate post reduction films

A/P: Closed reduction performed with conscious sedation. R wrist short arm splint, NWB. Discussed red flag sx. F/U FRC clinic 1 wk. Discharged home.

ADMISSIONS:

XXXXXXX – 60M R femoral neck # CODE HIP (16:30).
HPI: Patient with history of stroke from AVM in 1981. Ongoing global mild R sided weakness and dense neuropathy. Fall at work today (WSIB initiated), mechanical in nature onto R hip. No head injury. No cardiopulmonary prodrome. No seizure. No LOC. Unable to mobilize following. No hip pain prior to the fall.
PMHx: 1. Stroke (XXX from AVM); 2. Epilepsy; 3. Asthma; 4. L renal mass NYD, resected in 2012. No concerns in follow-up for malignancy.
Meds: Carbamazepine, Zoloft, Symbicort.
Allergies: Nuts.
SHx: Lives at home with wife. Mobilizes without gait aids at baseline, approx. 3km/day. Non-smoker. No EtOH. Works as a bail supervisor.
O/E: AVSS. R LE short, ER. No tenderness knee or ankle. Compartments soft. 0/2 sensation throughout R LE. Motor intact, 4/5 power throughout. Palpable DP and PT.
Imaging: XR – **R femoral neck fracture, displaced**
Code Status: FULL.
Plan: Admit to ortho (Dr. XXXX) with R femoral neck #.
Consented for R hip hemiarthroplasty vs. THA and booked as a C-Case. NPO. COVID pending. Rheumatology Consult for bone health.

XXXXXXXX – 69M R femoral neck # CODE HIP (2100).
HPI: XXXX the patient was chasing his cat and fell. No prodromal symptoms. No LOC. No head injury. Isolated R hip pain. Lay in bed for 10 days and presented to XXXXX. There, he was admitted and consented for surgery, but subsequently left AMA. Returns to ED today as his pain continues to be debilitating in his R hip. Used crack cocaine and crystal meth prior to presentation today.
PMHx: 1. Hernia; 2. Polysubstance abuse with overdose in July 2020 requiring ICU admission with presumed cardiac arrest; 3. Previous splenic lac.
Meds: Nil.
Allergies: NKDA.
SHx: Retired veteran, lives alone. 1PPD smoker x 60 years. Daily cannabis 2-3g/day. Weekly IV/smoking cocaine, crack, crystal meth. Opioid abuse weekly (Percocet, oxycodone).
O/E: AVSS. Tender w/logroll R hip. No tenderness knee or ankle. Compartments soft. DNVI.
Imaging: XR – **R valgus impacted subcapital femoral neck #** CT completed at TEGH on ConnectingOntario.
Code Status: FULL.
Plan: Admit to ortho (Dr. XXXX) with R valgus impacted femoral neck #. Consented for R hip ORIF vs. hemiarthroplasty and booked as a C-Case for R DHS. NPO. COVID pending. Anesthesia consult pending. Addictions to be consulted in AM. Dopplers to R/O DVT given recent immobility. Geriatric consult for bone health.

Residents Complete Inpatient Order Set

Physician Consults:

Consult Geriatrics for patients 65 and older, Rheumatology for patients under 65.

- ☐ Consult: Geriatric Internal Consultation Team (ICT)
- ☐ Consult: Medical Consultation
- ☐ Consult: Rheumatology to Assess and Implement Recommendations Reason for Request: Osteoporosis Investigation and Management .

- Osteoporosis Screening:
- [ ] Calcium Daily x 1 Times Priority= AM Collection
- [ ] Albumin Daily x 1 Times Priority= AM Collection
- [ ] ALT Daily x 1 Times Priority= AM Collection
- [ ] ALP Daily x 1 Times Priority= AM Collection
- [ ] TSH (may include reflex Free T4/T3) Daily x 1 Times Priority= AM Collection
- [ ] Protein Electrophoresis AM Collection
  - NOTE: There is limited utility in repeating serum protein electrophoresis(SPEP), urine protein electrophoresis (UPEP) or serum free light chains in a short interval.
  - If these tests have been completed in the last 20 days they will not be processed.
  - Please contact the core lab at ext 5082 if you have an exceptional circumstance that warrants repeat testing.
  - [ ] Protein Electrophoresis Serum Daily x 1 Times Priority= AM Collection (required)
  - [ ] Total Protein (Tot Protein, Alb, Glob) Daily x 1 Times Priority= AM Collection (required)
- [ ] 25-OH-Vitamin D Daily x 1 Times Priority= AM Collection
- [ ] Beta-Crosslaps (Serum) Daily x 1 Times Priority= AM Collection
- [ ] PTH Daily x 1 Times Priority= AM Collection
- [ ] Ionized Calcium Serum Daily x 1 Times Priority= AM Collection
- ***For Patients 70 Years And Younger
- [ ] Celiac Screen Daily x 1 Times Priority= AM Collection
- ***For Males Only
- [ ] Free Testosterone (Bioavailable) Daily x 1 Times Priority= AM Collection

- [ ] Osteoporosis Intervention
  - [ ] Vitamin D3 / Cholecalciferol 1,000 Units PO Daily
  - [ ] Calcium Carbonate 1250 mg (500 mg Elemental) PO BID

Day 2 Handover Summary

- **Victoria:**
  - **reviews handover for pts who require assessment/Rx**
  - **reviews orders written by residents:**
    - **if no consult ordered by the resident, FPC prompts resident**
  - **sends daily email to residents and inpatient allies for inpt referrals**
  - **arranges f/u outpt investigations as requested by consultants (e.g. outpt DXA)**

Day 3: The resident makes inpatient rounds

- **Resident takes over the admitted patients seen on the handover**
- **Writes orders**
- **Arranges geriatric consults (≥65) or rheumatology consults (<65)**

Inpatient Allies

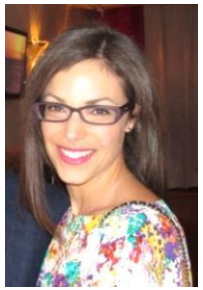
Dr. Camilla Wong

Geriatrician

(for patients ≥65 years)

Marjorie Hammond

Geriatric Clinical Nurse Specialist



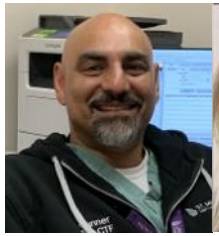
Dr. Erin Norris

Rheumatologist

(for patients < 65 years)

Priscilla Vivian

Pharmacists



Gunner Sarah

Discharge Planners

The key to Days 2 and 3

The handover document**

Resident comprehends that their daily work flow includes prevention**

Day 4 – the Resident in Fracture Clinic

The ortho resident goes to fracture clinic….

Fracture Clinic Team

Esther
Nurse

Caroline, Gina, Angelo, Lesley
Physiotherapy

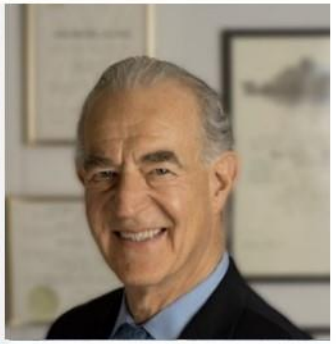
Chris, Shiraz
Technologists

Viya, Doniesha, Arane, Nichola
Clerical

Orthopedic Surgeons







Coordinator Flag for outpatient charts

This patient requires a BONE HEALTH assessment or follow-up.

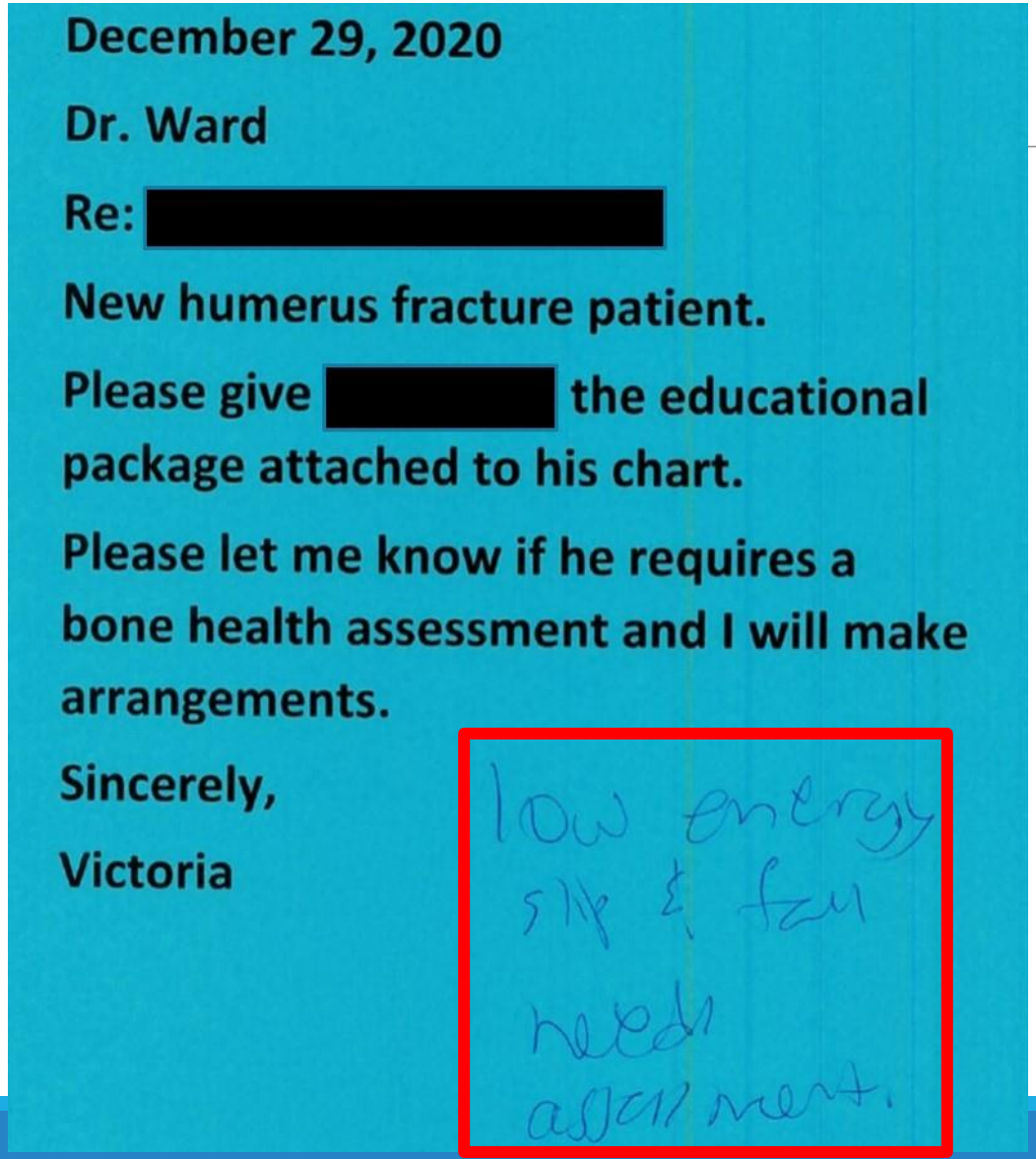
Your attention and consideration is appreciated.

Victoria Elliot-Gibson, MSc
Fracture Prevention Coordinator

Victoria

- flags charts: ***the pt requires assessment or F/U***
- reviews new pts with resident and ***arranges DXA, blood, specialist consultation***
- ***reviews F/U pts test results*** with the resident and ***ensures pt compliance***

Victoria's note on # clinic chart



December 29, 2020

Dr. Ward

Re: [redacted]

New humerus fracture patient.

Please give [redacted] the educational package attached to his chart.

Please let me know if he requires a bone health assessment and I will make arrangements.

Sincerely,

Victoria

low energy
slip & fall
need
assessment.

Surgeon/resident note back to FPC.

Day 4 Fracture Clinic

April 13, 2021

Dr. Bogoch

RE [redacted]

[redacted] bone health was assessed by Dr. Norris.

[redacted] is not at high risk of future fracture and has been advised to obtain adequate vitamin D and calcium through diet and supplements and have a repeat BMD with her family physician.

Sincerely,

Victoria

Dr. Bogoch Fracture Clinic April 13, 202 f/u pt

Victoria Elliot-Gibson

Yesterday, 7:42 PM

Earl Bogoch; Yue Ting Kero Yuen; Gina Peixoto; Esther Carter; Nichola +4 more

Reply all

Inbox

This message was sent with high importance.

This message has been marked as Confidential.

PRIVATE AND CONFIDENTIAL

Only 1 follow up patient identified for tomorrow.

I have printed the note to Nidhogg and I hope that Ben can put it on the chart for me (thanks).

[redacted] one health was assessed by Dr. [redacted] is not at high risk of future fracture and has been advised to obtain adequate vitamin D and calcium through diet and supplements and have a repeat BMD with her family physician. She is aware

Please continue to refer any patient that requires a BMD and bone health assessment and I will make arrangements.

Sincerely,
Victoria

Email from surgeon back to FPC

During COVID-19 Pandemic…..

Victoria works virtually during COVID (comes in some evenings and weekends)

Daily emails on Fracture Clinic pts sent to surgeons, residents and clinic staff

Clerical places FPC notes on charts and scans in surgeon feedback left on note and emails FPC

Surgeons/Residents email the FPC in follow up and dictate back to PCP

Ortho resident note to PCP from fracture clinic

1. Observations and orthopedic management of the wrist fracture (humerus, femur etc)

2. Investigations and plan for bone health management

Message to new low trauma fracture patients:

***Your low trauma fracture may be related to bone weakness**

***Fracture Begets Fracture: You had a broken wrist. You are now at risk of a much worse fracture of the hip**

***Your risk of a fracture can be substantially reduced.**

FPC Arranges Standardized Investigations with Residents

- Blood work panel
  - 25 OH D
  - Testosterone (males)
  - CBC, lytes
  - Creatinine
  - Ca, P
  - PTH, TSH
  - Serum protein electrophoresis
  - Serum CTX
  - ALT, Tissue transglutaminase

DAY 5:
RESIDENT GOES TO A DEDICATED BONE HEALTH SPECIALIST CLINIC

'PFOC'

POST-FRACTURE OSTEOPOROSIS CLINIC

PFOC Clinic Facilitated by FPC

Year 2 Ortho Residents: Learn post-fracture protocols

Residents work in the Post Fracture Osteoporosis Clinic (PFOC) 2 – 4 days

Residents provide a written “reflection” on their experience

Exclusive Resident Training Sessions in the PFOC

- All patients booked by Victoria from Fracture Clinic
- All investigations completed prior to consult
- Only for Fracture Risk Assessment and Rx for Fracture patients (No Paget's Disease, Hypophosphatasia etc.. in PFOC Clinic)

PFOC CONSULTANTS

Dr. Erin Norris

Rheumatologist

PFOC Consultant

Dr. Robert Josse

Endocrinologist

PFOC Consultant

Residents

Ortho Resident is Sole House Staff For PFOC

- **No rheum/endo/GIM resident or fellow**
- **Resident takes history, presents patient to OP Staff**
- **Plans treatment with OP Staff and patient**

Goals of Training

After PFOC rotation a resident can:

- **Perform hx and p/e for fracture risk**
- **Investigations to identify 2 causes of OP**
- **Understand DXA in fracture risk assessment**

Outpatient Consult Assessment Form

OUTPATIENT OSTEOPOROSIS CONSULT

Consult date: _____
Consult time: _____
Referring MD: _____
Family MD: _____

Patient Name:
MRN:
DOB:
Phone Number:

Patient's identity was verified, the process explained, and informal verbal consent obtained. It was advised to be in a private room for the assessment, and that the visit was not recorded. The patient is also aware of the limits of such assessments (no physical exam, not a format for urgent care.)

Mr/s. _____ is a _____ year old man/ pre/post-menopausal woman seen for: _____.

PAST MEDICAL HISTORY

_____ _____ _____
_____ _____ _____

MEDICATIONS

_____ _____ _____
_____ _____ _____

OSTEOPOROSIS HISTORY

Allergies: _____

Previous fragility fractures: □ no □ yes:

Age	Site	Circumstances

Height loss: □ none □ > 6 cm historical □ > 2 cm prospective

Osteoporosis Management: *(current, duration, previous, when/why stopped, proper administration)*

□ Calcium/Vitamin D intake:
- □ diet:
- □ supplements:

□ Bisphosphonate:
□ Ovarian Hormone Therapy:
□ Other:

RISK FACTORS FOR FRAGILITY FRACTURES AND BONE LOSS

□ Systemic glucocorticoids
□ Malabsorption syndrome
□ Hyperparathyroidism
□ Hypogonadism:
- □ Pituitary/hypothalamic disease
- □ Male sexual dysfunction
- □ GnRH/anti-gonadal treatment
- □ Infertility

□ Menopause: age ____
- □ Vasomotor symptoms
- □ History of irregular menses _____
  G ____ P ____ A ____ breastfeeding ____

□ Parental hip #
□ Fall in the last 12 months
□ Sight/hearing impaired
□ Use of mobility device:
□ Rheumatoid arthritis
□ History of hyperthyroidism
□ Chronic anticonvulsants/heparin
□ Smoker □ quit ____ □ current ____ pk yrs
□ Alcohol ≥ 3 units/day
□ Caffeine:
□ Wt <57kg/128lb
□ Weight loss >10% since age 25
- □ History of disordered eating

□ Sedentary □ moderately active □ very active:

REVIEW OF SYSTEMS

_____

FAMILY HISTORY

_____

PHYSICAL EXAM

Weight Height BMI
BP sitting standing HR
Sclerae/Teeth/Thyroid _____
Chest/CVS _____
Abdomen _____

SOCIAL HISTORY

Occupation/Home situation: _____
Drug plan: □ no □ yes
Previous home OT assessment: □ no □ yes
_____

Gait: □ normal □ abnormal _____
Balance: □ normal □ abnormal _____
Spinal contours: □ normal □ abnormal _____
Spinal tenderness □ absent □ present _____
Rib-pelvis distance: _____ finger breadths

BMD results: *(lab location)*:

	T- or Z-score		% change	Comments
Date				
Lumbar spine				
Total Hip				
Femoral neck				

INVESTIGATIONS

Labs: **Imaging:**

ASSESSMENT AND RECOMMENDATIONS

Mr/s. _____ is a _____ year old man/pre/post-menopausal woman with:

- □ osteoporosis (t-score <-2.5) □ osteopenia (-1.0 to -2.5) □ normal (≥-1.0) on BMD (postmenopausal women and men >50)
- □ reduced bone density (<-2.5)) □ normal (≥-2.5) on BMD testing (premenopausal women/men <50 years old)
- □ fragility fracture(s) at _____
- □ at risk for bone loss due to:
- □ at risk for fragility fractures due to:

His/her 10 year fracture risk is □ Low risk (<10%) □ Moderate risk (10% to 20%) □ High risk (≥ 20%)

The following recommendations were made:

1. Lifestyle factors: □ Daily Calcium 1200 mg + Vitamin D 1000 IU from diet and supplements
   □ Exercise (weight bearing + posture strengthening)
   □ Fall prevention strategies/hip protectors
   □ Smoking cessation □ Decreased caffeine/alcohol intake
2. Pharmacological management: □ Continue _____
   □ Start _____
   □ Change _____ reason_____
3. Investigations required: □ None
   □ Blood / urine tests to rule out secondary causes of accelerated bone loss
   □ Thoraco-lumbar spine x-rays
   □ Other:
4. Referrals: □ OT □ PT □ CCAC □ other:
5. Follow-up: □ BMD _____ □ clinic _____ □ other _____

Name _____ Signature _____
Staff MD _____ Dictation # _____

Residents use this format for bone health assessment

Our alumni:

CONTINUING FRACTURE PREVENTION AFTER RESIDENCY

Continuing Fracture Prevention in Practice

Over 100 residents trained since 2012

New graduates contact us to help initiate an FLS in their new hospital

OR

We provide materials and link new graduates to Osteoporosis Canada

……..from British Columbia to Newfoundland!

THE BROOKFIELD CHAIR IN FRACTURE PREVENTION

…at University of Toronto